Australian Model Engineering

January-February 1997

Issue 70

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In This Issue:
- ☑ Thomas the Tank Engine & Copyright
- ☑ 8th Miniature Traction Engine Rally
- ☑ Two Internal Combustion Engines

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Herr Diesel's Engines

Fascinating Illustrated History

DIESEL'S ENGINES

by Lyle Cummins

Some guys rob a bank (you almost have to) and go out and buy a brand new 18 wheeler. But because they demand the best, they have the stock engine ripped out, and a Cummins diesel bolted in. Many fanatics will tell you that Cummins is to diesels what Porsche is sports cars.

This is a book about diesels written by a Cummins. Not only is Lyle a member of the engine dynasty, he's also a mechanical engineer (holding a number of engine patents) and engine expert in his own right. And this is one great book:

"Diesel's Engine is the readable and comprehensive history of the man and the engine. It traces the life of an obsessed engineer and his contemporaries who brought the world's most efficient heat machine to the marketplace. Rudolf Diesel' s ideas were often ahead of their time, and his engine endured failures and setbacks until new technologies were .found. Only interim, imaginative solutions overcame the frustrating problems encountered.

What Rudolf invented, as perceived by his peer defenders and detractors in technical courts of law, is viewed with an advantage of historical hindsight. His engine created an international industry through the struggles of risk-taking licensees who turned it into a reliable, land-based powerplant. It soon went to sea as propulsion destruction. These dedicated licensed companies, with their strengths and frailties and the gradually maturing products they built are related with an understanding and empathy by one who both knew of and faced similar experiences at a later time. Above all, Diesel's Engine is *about a troubled man who devoted his life to a dream, yet at his zenith of fame lost control over its fate."*

This is very readable, loaded with mechanical drawings, photos of people and especially of all types of diesel engines in factories, ships, locomotives, and those nasty WWI German submarines. You get nitty-gritty detail about cylinders, displacements, bhp, numbers built and all that with much info coming from German archives. This history ends in 1918.

Some people think diesels are efficient because of their compression ratio. Not necessarily so. Some people think they're slow. Wrong. In fact in 1952 a modified Cummins truck engine was kicking butt in the Indy 500 until an air intake screen clogged. And that wasn't the only time Cummins engines were used in the race. Expensive book! But really underpriced once you see the material Lyle Cummins drops in your lap. It's big — almost 3" thick.

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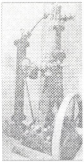

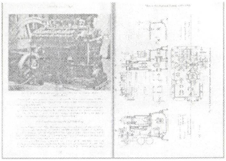

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- VR's S309 and S310 with a Jet;
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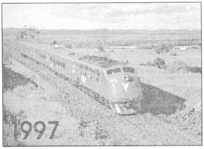
- VR's B75 on a Ballarat Passenger;
- SAR's 900s on the stone train;
- 4006 on the Newcastle Express.



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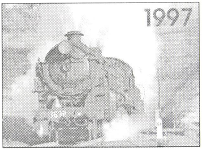

Nostalgic scenes in the NSW steam era calendar include:

- 3090 crossing the Cudgegong River;
- RVR No.10 at Stockrington;
- 3828 and 6015 storming Hawkmount;
- 3616 and 3523 at Warrigundi;
- East Greta No.14 at Hexham;
- 3236 crossing Stanwell Creek;
- 3803 at Gosford;
- 3245 crossing Boorowa River;
- 5189 with non-air coal hoppers;
- 5490 on the Hermitage Colliery branch;
- 5905 on a pick-up;
- 3308 on the 'Nyngan Mail',
- 3607 in the snow at Orange.

Each month has plenty of space to make notes about coming events!

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Please have your space for
March-April 1997
issue booked by:
Monday 20 January 1997

January-February 1997 Issue 70

Contents

5 Comment
9 More than trains at Wagga Wagga
12 Traction Engines at Inverell — 1996
14 Steam Chest
17 Multi-Hole Blast Pipe
18 Club Roundup
19 Coming Events
20 Two IC Engines on the Smell of an Oily Rag
24 Drills and Drill Sharpening
26 Tracks 'n' Trees (Garden Railways)
28 The MPS Digital Readout
35 Managing your Model Locomotive Boiler — Part 1
36 90 Not Out!
37 Using images of *Thomas and Friends...*
38 The Hales Creek Railroad
39 A 2½" scale Fowler Locomotive — Part 2
43 Back Issues Listing
44 50 Years at SASMEE Park
45 The Road to Cobden 1997
46 Under 25s Encouragement Award Entry Form
47 Under 25s Award Conditions of Entry
47 New Subscription Form
48 Boiler Tube "Bullets"
49 Loco Boiler Repairs — Water Treatment — Final
50 Letter Box
51 Painting Brass
52 News Desk
53 Classifieds

The Cover

"Scale" can be misleading at times as this view of Peter Smith's 4½" scale Allchin (behind) and John Gibson's 2" scale Durham & North Yorkshire traction engines prove! See what else turned up at Inverell this year in the story from page 12.

Photo: Brian Carter

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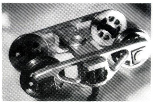

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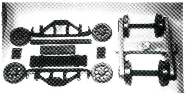

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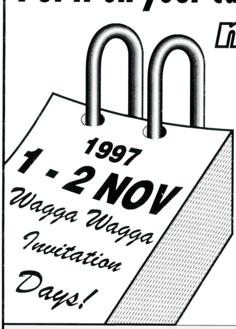

(Check out the review of the 1996 event on page 9 of this issue of AME)

Great fun! 5" and 7¼" track in scenic surrounds. Traction engines! Stationary models! Full-size historic engines! Boats on the Wollundry Lagoon! HO scale layout! Loads of tourist attractions!

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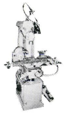

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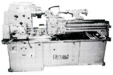

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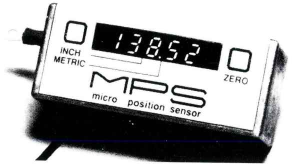

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Comment

On the Road to Number Ten

October 1987 saw the first issue of the Australian Model Engineering Magazine. As we begin the countdown to AME's tenth anniversary in October 1997 it may be an opportunity to reflect on the pathway that has led us towards this significant milestone.

The first commercial publication, *Model Engineer in Australia and New Zealand,* appeared from November 1935. Under the guidance of its editor Mr. A. Mar. Chalmers, the magazine continued to serve the model engineering community in Australasia for many years.

It is not surprising that Mr. Chalmers wrote in his first editorial: "...It is truly gratifying to have received such a wonderful response from so many 'brothers of the craft' in all walks of life, and from all points of the compass, which even the suggestion of 'Our own' monthly journal has evoked....".

In October 1987 Mark Whittaker picked up where A. Mar. Chalmers left off — even if it was to be many decades later — and *Australian Model Engineering* was born. Mark wrote in his first editorial: "...One of the major gaps in the world of model engineering in Australia seems to be information about what people and clubs are doing. We have people working on clocks to steam boats to some of the smallest locomotives in the world. We have visitors to and from New Zealand, Japan, the United States, England, Europe and Africa. Yet they know very little of our activities...." At the time, AME was only available by subscription and through specialist hobby stores. I think circulation was about 1000 copies for each monthly issue.

In May 1990 the final edition of *Australian Model Engineering* edited by Mark Whittaker appeared. The model engineers in Australia suffered a great loss — until Neil Graham coordinated a rescue mission to bring AME back.

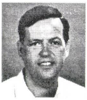
November 1990 saw the introduction of AME in its present format with Neil Graham as editor. The AME team decided to go bi-monthly and supply newsagents via Gordon & Gotch as well as subscriptions and specialist hobby suppliers. From this time circulation exceeded 4000 copies for each issue. The magazine's growth continued under Neil's guiding hand until a change of employment in 1993 meant a change of editor. But AME continued.

Model engineers in Australia have been extremely generous with their time and talents. Without them AME would not have survived so long. In the panel below it says "One of the great things about our hobby is the way model engineers actively help each other." It was just as true in the 1930s as it is today!

Today, circulation exceeds 6000 copies and includes colour in most issues. AME is now a well respected journal on the world stage and I am proud to be part of our world. With your continued support AME will continue to grow into the next millenium.

May 1997 bring you joy, peace and prosperity.

Brian Carter



To our new reader

If this is your first issue of Australian Model Engineering, welcome! We hope you'll look forward to the ideas, news and camaraderie in each bi-monthly issue.

One of the great things about our hobby is the way model engineers actively help each other. Unless you live in an isolated community, you'll soon discover who has valuable experience in your field of interest, or who will help you to make a part that's too big for your workshop machinery. Look in the *Club Roundup* section to find a club that's near to you; pay a visit and you'll usually find model engineers who live not too far away. Then you can experience the great fellowship that makes our hobby special.

This magazine is prepared in the same spirit of "model engineers helping each other". About two dozen people put many hundreds of hours work into each issue — all on a voluntary basis — to help model engineers in Australia and New Zealand keep up to date and stay in touch.

We rely on our readers to write articles for us — for the same (non-existent) rate of pay! If you have ideas or techniques that you feel would be interesting to others, please drop us a line. We'll gladly help with preparation of artwork or editing if that's necessary. Most important of all, please support the people who advertise in our magazine. Without them to pay the bills, you wouldn't be reading this!

Brian Carter

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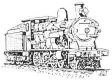
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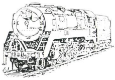
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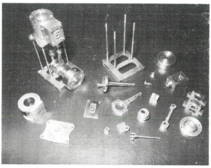

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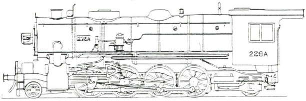

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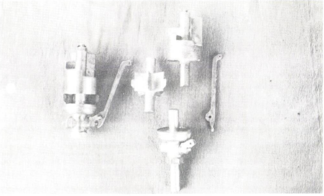

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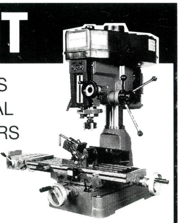

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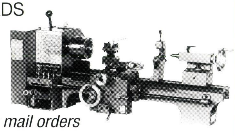

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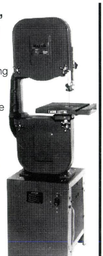

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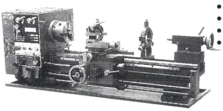

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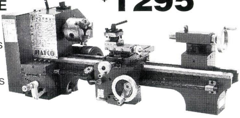

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More than trains at Wagga Wagga

Invitation Run 1996

by Clive Huggan

Photos by Clive Huggan unless otherwise indicated

Activities *off* the dual-gauge track made their presence felt this year at Wagga Wagga — almost to the point that the term "Invitation Run" might be a misnomer.

For example, two kilometres from the railway, the club has a beautiful spot for boating on the Wollundry Lagoon — a long, picturesque billabong off the Murrumbidgee that passes under the main shopping street. Some excellent state-of-the-art boats were sailing there. Les Hale's recently completed J315 *HMAS Wagga*, one of the 60-strong Bathurst class corvettes, was topical. And Alan Fern's 1920s Royal Air Force pinnace, down from Galston, was an example of craftsmanship that brings you to your knees. From the scratch-built 15cc diesel that powers the boat to the electric "help-you-get-to-shore" emergency motor, the tape recorder that plays an appropriate band-music repertoire, and the excellent drive clutch, this model showed immense thought, care and skill in its construction. It was worth the trip in its own right, and there were many others of very high standard.

Alan Fern (centre) built this superb RAF pinnace that attracted attention at Wagga Wagga's Wollundry Lagoon.

WWSME members always appreciate the journeys people make to get to the Invitation Run — especially model engineers like Bob Nash, Reg Whitford and Bill Gillespie from SA, Warren Starr from MELSA Bribie Island, the Berry bunch, the strong Hornsby contingent, and the Gippsland visitors who hired a light aircraft to get there. This appreciation was experienced by the boat modellers who were invited around to Ron de Brueys' place on the Saturday night for what they thought would be a short visit. It was almost 11 before they left, chock full of shared ideas, yarns and enthusiasm, and delighted to have seen Ron's immaculate workshop.

There was plenty of time for people to quizz Alan Fern (with RC) on the workings of his superb RAF pinnace.

Phil Gant with his Achievement Award for the "best achievement by an owner-builder".
Photo: Brian Carter

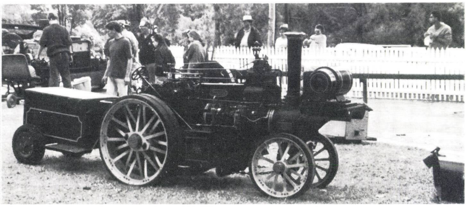
Bill Gillespie, from Quorn SA, leaving the new refuelling facilities on John Nicolson's Black Five work-horse.

Phil Hartley (standing on right) receives the Southern Cross Steel Fabrications prize for the best new model

Photo: Brian Carter

Meanwhile, back at the railway, boat-building interest figured in the prize line-up: Phil Gant, an accomplished boat builder from Hornsby Model Engineers, won the Achievement Award for the "best achievement by an owner-builder". After building five steam boats, Phil decided to "make something different" and set his sights on his first steam loco — a 5" gauge model of NSWGR 4-6-0 No. 3203. This superb model was acclaimed by all who saw it.

The Southern Cross Steel Fabrications prize for the best new model was awarded to Phil Hartley for his 7¼" gauge *Simplex*. It too is a superb piece of work. Phil built it in less than three years — and that included fabricating everything other than cylinders and wheels, and making all the components including clacks, injectors and lubricator. That's why Phil's mates call it the *Complex*! Unfortunately, Wagga Wagga people won't be seeing Phil or his loco for much longer: in the new year the RAAF is posting him and his family to Western Australia.

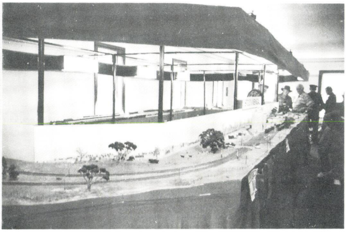


Mike New's traction engine, from Hornsby, was one of several kept busy on the new traction engine track.

With 43 locos present, there were plenty of rides at Wagga Wagga but not the congestion of previous years. The club recently made the left track available by moving refuelling activities to a new facility, allowing the right-hand track to be used as a through route.

This year 43 locos were present: down on last year, like most venues lately, but probably the ideal number for this track, as there were no major hold-ups at all. The club's new coaling/watering sidings helped reduce congestion too.

Among the visiting locos were some excellent NSWGR 5" gauge models, which led the club to organize them into a special drive-past. The AME 422 class project loco, which



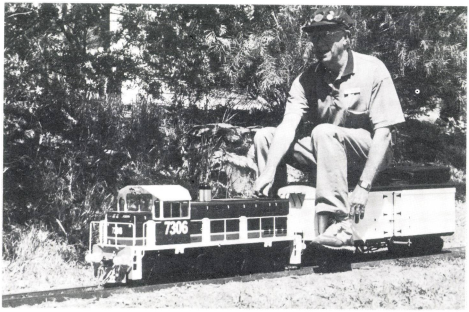
Stockinbingal, the HO scale layout of WWSME members, was operating in the club's new display building.

Peter Parsons and Steve Karas enjoyed displaying WWSME's HO scale layout of Stockinbingal NSW.

AME Managing Editor Brian Carter brought with him, and Bill Abbott's 422 class, also drew many comments. There were not many mainline models in 7¼" gauge, which again seems to be the trend.

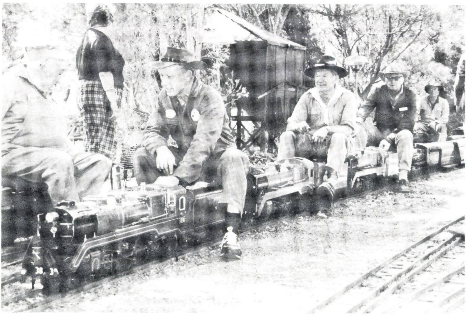
Up in the club's newly completed display building, now housing memorabilia previously stored at the railway station a kilometre away, was Reg Watters' exquisite, no-compromise 5" gauge GWR King class 4-6-0, finished except for the boiler. Next to it were boat models on static display, and the club's HO scale railway layout of Stockinbingal. It's interesting to see this layout getting better each year: it is now at a very high standard.

Moving out of the display building to the nearby catering caravan, operated throughout the weekend by hard-working lady club members, it was a pleasure to see the traction engines choofing along the recently finished pathways — purpose built with the help of people in the LEAP employment program. The members have been keen to attract traction engine owners, and the new track should prove a real draw-card as word gets around.



John Wood guides his excellent NSW SRA 73 class battery-electric loco. The batteries are housed in the nicely detailed MRC refrigerator car.

Photo: Brian Carter



Three 38's and a 35 lead the engines on the NSW SRA locomotive parade. All 5" gauge, a fourth 38 class is on the track behind the 35 class.

Photo: Brian Carter

Additionally there was the Historic Engines Club display, reached by the Museum Loop that tunnels under an arterial road. The banging of one-cylinder engines is always a pleasure to hear, but the occasional firing-up of a snarling radial aero engine was music to my ears as I manned the point lever at the loop. Then it would cut out and I could hear, faintly, the strains of club member the Reverend Dick Goodman conducting a well-attended outdoor service at the tree chapel. I suspect Dick had something to do with the rain holding off till after the Invitation Run closed on Sunday!

The Victorian model engineer who told me "This is the highlight of the model engineering calendar for me" pretty well summed it up, even if the name "Invitation Run" may no longer be adequate to describe this great weekend.

Traction Engines at Inverell — 1996

by Brian Carter

Photos by Brian Carter unless otherwise indicated

The normally quiet country town of Inverell in northern NSW erupted on the weekend 19 and 20 October with the sight and sound of twenty-four miniature traction engines. The "track-less" steam enthusiasts gathered from many parts of the country to share their hobby at the 8th Miniature Traction Engine Rally.

The country hospitality is always a pleasure to experience, and this year was no exception. Gordon Blake was once again our gracious host at a barbeque on Friday evening. Unfortunately, the firework display to herald the beginning of the district's Sapphire Festival was held on the previous evening — the pleasant company was more than enough compensation!

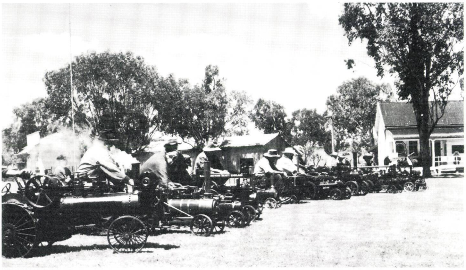
The location

A comprehensive report on the Inverell Pioneer Village appeared in the 1995 Traction Engine Rally report in AME, March-April 1996 on page 21. For the benefit of our new readers I will summaries the main features. Inverell's Pioneer village is a unique location for a rally of this type. The village comprises of many buildings that were found around the surrounding district — all trucked in to this central location. The original occupants of these buildings would not have been strangers to traction engines! *The Grove* Homestead built in 1841 is the oldest building on site.

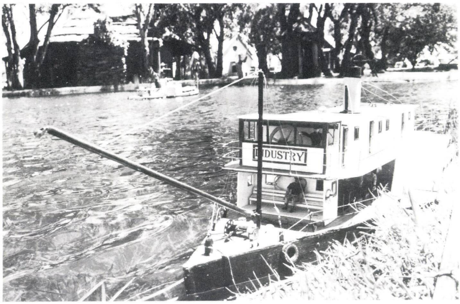
Steam traction on the water

In last year's report, a suggestion was made that model boats would look good on the man-made lake. Frank and Ashley Blades took up the offer and brought a selection of several River Murray paddle steamers. All but one was live steam — they looked great on the water!

The models were: PS *Industry*; PS *Adelaide*; PS *Pevensey*; PS *Alexander Arbuthnot*; a 1920 Pilot vessel and a 1920 custom launch.

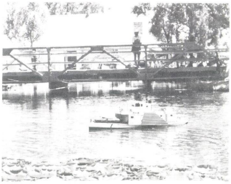


One of the most impressive events at a traction engine rally is the line-up for the start of the grand parade. The signal is given for the united whistle blow and soon after they peel off and amble along the path at a leasurely pace.



A new attraction at Inverell this year were the paddle steamers. It was a bit like "Traction Engines at Inverell by the River Murray!"

Part of the Inverell traction engine rally culture is the "camp fire". A dusk three traction engines fitted with dynamos and lighting became the centre piece for yarn sessions until late.



The road bridge over the lake. This year the paddle steamer fills the void.

Each vessel is about 1500mm long. No plans were used, but extensive use was made of photographs. Many detail components were added which enhanced the overall effect. It is a pity I don't have the space to show you all the boats — mabye I'll sneak them in the Maritime Matters column occasionally.

The roll up

This year there were 19 traction engines in steam and seven in various stages of construction. About three engines were there for the first time.

It would be impossible to estimate the number of laps, but the engines just kept on rolling! Many drivers offered rides to very willing passengers who thoroughly enjoyed the experience.

Retail supplies

The Oakwood Memorial Hall was once again a busy place as Ernest and Joan Winter set up an inviting model engineering supplies stand. Other commercial displays comprised of craft supplies.

Saturday evening

The evening barbeque was a sumptuous feast cooked by Les Moulds and assisted by his wife Yvonne and a very willing band of helpers. This was followed by a jovial session at Paddys Pub (circa 1870). Our songsters were Les Parsons and Andrew Fuller with some poetry recital and stand-up comedy from Councillor Darryl Barnes.

The sound of traction engines ticking over supplying power for the "camp fire" was heard quietly in the background during the "concert". A great way to spend an evening!

The next day...

Some of the drivers prepared their engines very early. "I love the smell of wafting steam in the morning!"

The day was shaping up well — the weather was good for the whole weekend. A few made preparations for the return journey home, but the remainder hit the track for another day behind the throttle.

The next rally

An early morning meeting was held to decide on the rally venue for 1997. After some debate it was decided to adopt the offer of Bob Neale of Maitland NSW. The next rally will be held at the Wolka Water Works at Maitland. It should be a spectacular event as Bob is also the Chair of the Maitland Steam Fest.

Two other offers were made but were not ratified by their clubs. It may be possible that the 1998 rally will be in Canberra and the 1999 rally may be in Petrie (Brisbane) the home of the Queensland Steam and Vintage Machinery Society. Gordon is hoping for a return to Inverell in 2000.

The 1996 rally was a weekend to remember. I would not hesitate to recommend Inverell to anyone looking for a taste of country hospitality. See you in Maitland!

Dave Watkins of Orange NSW produced this "Foden" look-alike from a "Matchbox" model! Dave doesn't know what the scale is, but the model looks somewhere around 4" scale. The wagon performed very well throughout the weekend.

Photo: John Snowden

John Dew from Live Steam Supplies (Victoria) with his 4" scale Clayton undertype steam wagon.

Photo: John Snowden

Alan Chapman's 3" scale Foden Wagon resplendent in its dark green cab and white lettering. Last year Alan ran his Foden without the body work. The wagon had a few teething problems but showed its potential when finally got under way.

Photo: John Snowden

Steam Chest

with Dave Harper

Hi There, steam fans and welcome to another collection of steam stories.

Firstly, some feedback on the Marsh pump pictured on page 21 of the July/August issue; Mr A. W. Thuys of Port Adelaide, SA, kindly sent me some information from an old American reference book dating back to 1906.

The relevant section from the book reads as follows: "The Marsh steam pump, the steam end of which is shown in section in Fig 7. has a valve that is operated without any mechanical connection with the piston or piston rod, being entirely operated by steam pressure. The steam piston a is made in two parts, so arranged as to provide an annular space between them, each section being provided with a packing ring.

Steam, at boiler pressure, is admitted within the pistons by means of the tube *b*, which is rigidly secured to and is in communication with the chamber *c*. A stuffng box in the piston through which it plays prevents leakage into the main steam cylinder.

A small port d, shown by dotted lines, supplies steam to the chamber *c*. When the piston is moving to the right, steam is entering from the space *n* through the annular opening between the reduced neck of the valve *g* and bore of the left chest wall *p*.

It is thus projected against the inside surface of the valve head *h* before escaping through the port and passing into the cylinder.

Both the pressure and the impulse due to the velocity of the entering steam act on the valve head *h* and tend to force it to the left, thus tending to close the annular opening in the chest wall *p*. The steam flowing through the annular opening and port l into the cylinder also flows through the small ports m and e to the left of the valve head *h*.

The steam entering through these ports is wire-drawn, so that its pressure is reduced, but it has a greater area of the valve head *h* exposed to its pressure than the steam on the right of *h*. Hence, the valve *g* moves to a position where the total forces acting on the two sides of *h* are equal and then remains stationary. The steam entering through the annular opening in the chest wall *p* is also wire-drawn, so that the pressure on the left of the piston a is below the full boiler pressure existing in *n*.

While the piston *a* is moving to the right, the steam on the right is exhausting through the port *f* into the exhaust port *j*. The exhaust is first closed by the piston running over the port *f*; as soon as this port is covered, the port *e'* leading to the right of the valve head *h'* communicates with with the space within the piston containing steam at boiler pressure, and this steam rushes into the space to the right of the valve head *h'*. Since the steam pressure on the left of *h* is less than the pressure on the right of *h'*, the valve moves to the left, and by doing so closes the left steam inlet, opens the left exhaust, and also opens the right steam inlet in the chest wall *p'*. The live steam admitted to the right of the piston a first brings it to rest and then reverses its motion. The tappets *k* and *k'* are used for moving the valve by hand in case the valve is stuck."

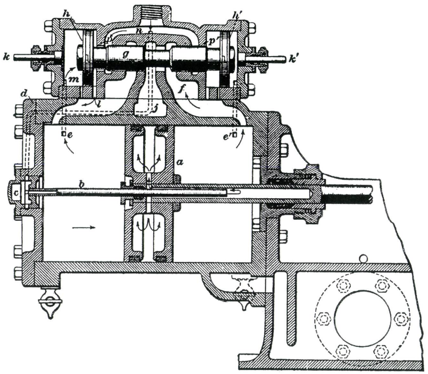


FIG. 7

Very ingenious, almost as hard to figure out as the Weir pump! It obviously worked well, but it's hard to see how it could be produced on a model scale.

More feedback

I've also had a couple of people call me about the old vertical engine at Mogo, NSW, photo 5, page 17 of the September/October issue.

The general consensus is that the skew gear on the centre of the crankshaft drove the governor and the eccentric on the right drove a feed pump, both of which are now missing.

Also, by coincidence, there is a series running in the Model Engineer on what looks to be an almost identical engine, called there the Benson engine.

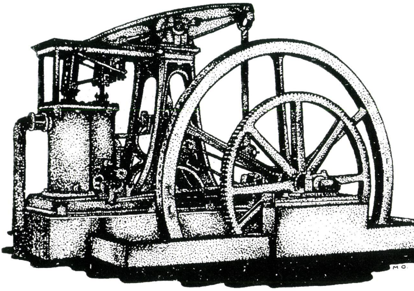
That skew gear still seems out of place to me; can anyone out there tell us when skew gears were first made? It could of course be a later addition, just as the fabricated pulley almost certainly is.

Queensland Museum's beam engine

Talking of later additions naturally leads me to the next story; one of the Qld Museum's prize possessions is an 1866 Woolf Compound Beam Engine. It used to be diplayed outside the old Qld Museum in Fortitude Valley, Brisbane. However, since moving to their new premises at South Bank the engine has had to languish in storage.

I first discovered it when I was shown around their warehouse by Chris Lloyd of the Museum.

I was immediately struck by the classic Porter governor fitted to this engine; firstly,



1866 Woolf Compound Beam Engine sketch from the original leaflet produced by the QSV museum in 1973.

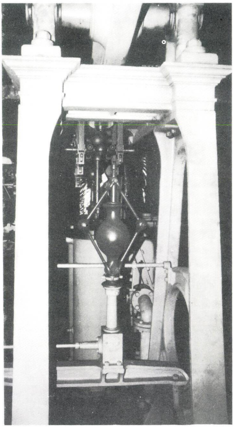


Photo 1.

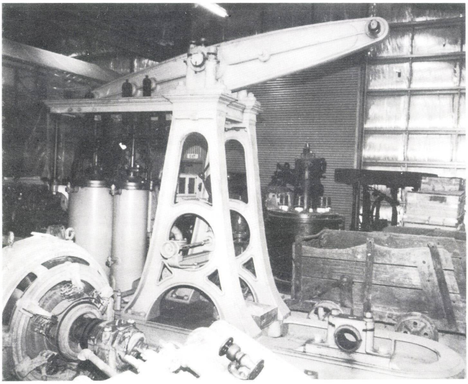


Photo 2.

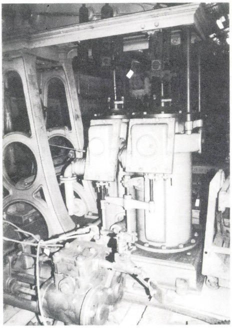


Photo 3.

the Porter governor was designed for higher speed engines and secondly the plate on the governor clearly states 'Ormeron & Grierson, Manchester, 1878'

Ormeron & Grierson were the English licencees of Charles Porter, so that's no problem, but the museum claim that the beam engine was built by Easton, Amos and Anderson of Erith, Kent in 1866. However, the mounting of the governor doesn't look like an afterthought. Another of life's little mysteries....

Photo 1 shows the governor with its classic vase-shaped centre weight. Later models reverted to a simpler shape. (If you want to know all about Charles Porter and his inventions, invest in a copy of *Engineering Reminiscences* from a book dealer who advertises in AME, one of the best reads on steam engine history you'll ever find!)

Photo 2 is a general view of the engine, as clear as I could get among the stuff piled all around it!

Photo 3 is the other side, showing the valve chest, Photo 4 is a close-up of the beautifully made parallel link motion, and photo 5 shows the drive gear which is about 8ft dia. and the 14ft dia flywheel laying in two pieces on the ground.

Talking to my old steam friend Dave Sampson about this engine some time ago stirred his memory and he produced from his amazing filing system a copy of the original leaflet produced by the museum in 1973 when the engine was first displayed!

Also from the leaflet comes the following information:

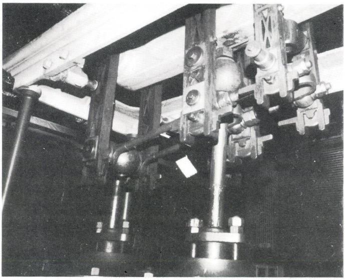


Photo 4.

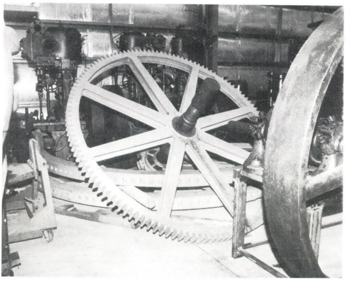


Photo 5.

Steam pressure 60-70 psi. 75rpm, 75hp.

HP cylinder 12.5" bore x 25.5" stroke, LP cylinder 20.25" x 36".

Beam operating length 10ft.

The flywheel is of local make, marked Sargeants Engineers, Brisbane. The original flywheel may have been smaller.

The engine is believed to have been originally used by James Tyson for pumping water for washing sheep prior to shearing on the Darling Downs about 1881.

In 1895 it was moved to Lars Anderson's sawmill in Esk and continued in use there until 1946!

It was acquired by the Qld Museum in 1968 and stored until it was restored for display in 1973. On November 22nd of that year it was run on compressed air for the first time.

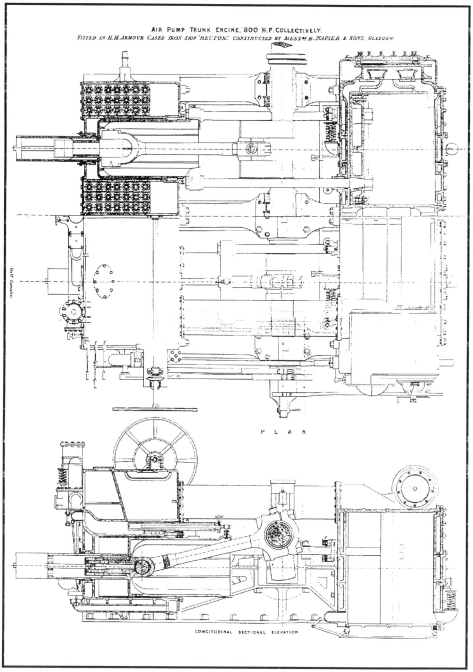
It's a great shame that such a rare and original engine has to languish in storage, I'm sure Chris Lloyd would welcome any help to redress the situation!

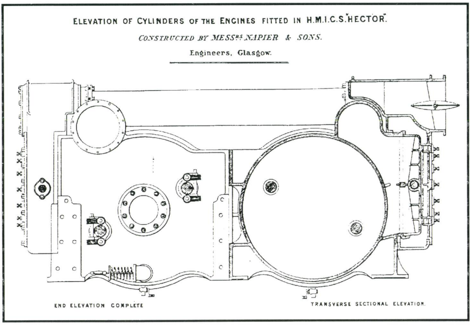
More from Burgh

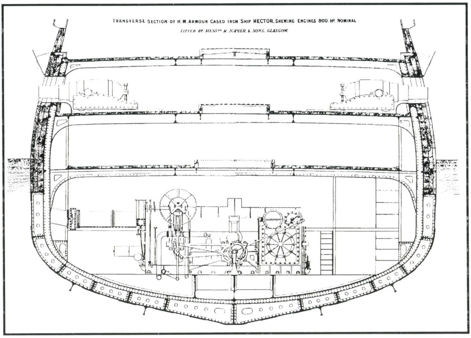
Now for the next selection from Burgh's *Modern Marine Engineering* of 1872. Following on from the double trunk engine I thought the air-pump trunk engine would be of interest: this set of engines was built by Napiers and fitted into the 'Armour Cased Iron Ship HMIS *Hector*'.

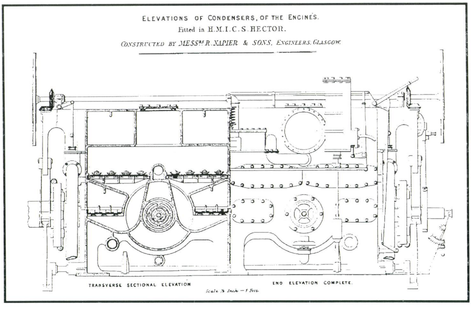
Included is a magnificent cross-section drawing of the ship showing how the engines were set low in the hull to protect them from enemy fire.

Incidentally, another snippet of information on practice in those days came from Eric Abbott, one of my QSVMS associates. It seems that when going into action the early steam warships were ordered to reduce boiler pressure to a couple of pounds above atmospheric. This was to prevent an explosion if a boiler was hit by a shell! Thus the engines were designed to run with maximum con-


AIR PUMP TRUNK ENGINE, 800 H.P. COLLECTIVELY.
FITTED IN H.M. ARMOUR CASED IRON SHIP "HECTOR." CONSTRUCTED BY MESSRS R. NAPIER & SONS, GLASGOW.
PLAN
LONGITUDINAL SECTIONAL ELEVATION


ELEVATION OF CYLINDERS OF THE ENGINES FITTED IN H.M.I.C.S."HECTOR".
CONSTRUCTED BY MESSRS NAPIER & SONS.
Engineers, Glasgow.
END ELEVATION COMPLETE
TRANSVERSE SECTIONAL ELEVATION.


TRANSVERSE SECTION OF H.M. ARMOUR CASED IRON SHIP HECTOR, SHEWING ENGINES 800. HP. NOMINAL
FITTED BY MESSRS R. NAPIER & SONS. GLASGOW.


ELEVATIONS OF CONDENSERS, OF THE ENGINES.
Fitted in H.M.I.C.S. HECTOR.
CONSTRUCTED BY MESSRS R. NAPIER & SONS. ENGINEERS. GLASGOW.
TRANSVERSE SECTIONAL ELEVATION
END ELEVATION COMPLETE.
Scale ⅜ Inch – 1 Feet.

denser vacuum, and high boiler pressures were of limited value.

Thus ran the wisdom of their Lordships of the Admiralty!

Back to Burgh — in order to keep the engines down to a reasonable width, each piston had two piston rods, set at approx 2 o'clock and 8 o'clock so they passed one above and one below the crankshaft.

Instead of a crosshead and return connecting rod as was the norm for these engines, the air pump was made in the form of a large trunk to which the piston rods were attached. From a bearing in the centre of the trunk the connecting rod transmitted the power to the crankshaft.

A study of the drawings will give an idea of the setup, and these are a few of the principal dimensions:

Nominal HP 800, cylinder bore 82", stroke 48", diameter of air pump 43", depth of piston 14", diameter of crankshaft 16.5", length of connecting rod 8ft 9ins.

Details of the ship are length 280ft, beam 56ft 8ins, depth 38ft 2ins. The 2 bladed screw was 20ft dia x 25ft pitch. Nowhere among the mass of information is there any mention of RPM or steam pressure...

That seems to be about all for this time; happy steaming!

Multi-Hole Blast Pipe

by Rod Sullivan

Following the article in AME, July-August 1993, page 21, regarding multi-hole blast pipes, my son fitted one to my ⅛ scale Shay with immediate benefit — you could even hear the difference!

However, after many hours' steaming we literally ran out of puff, the cause being the soft piston packing wearing out and becoming caught in the holes of the blast pipe.

So the multi hole blast pipe has a dual benefit for those of us who use soft packing: it improves the blast and also tells you when to check your piston packing! Now, if the packing came in three colours, I would know which cylinder to check — not an easy job on a Shay!

Club Roundup

compiled by David Proctor

Galston NSW

The Galston Valley Railway braking requirements as reported in the November-December 1996 issue, on page 16, has been changed. The information as published was correct at the time of AME going to press. The following is taken from the December 1996 copy of the Galston Valley News... bmc.

The braking matter has been finalised by the following statement from the Board of Directors:

"As braking requirements of trains are fully covered by the Operating Codes of AALS and our own club, all trains operating on the Galston Valley Railway are to have DEMONSTRATED EFFECTIVE BRAKING, there is to be no restriction on the type of brakes fitted."

A letter from the Chairman pointed out that the one exception is that brakes acting directly on the rails are prohibited....bmc

Hornsby Model Engineers Co-op Ltd
Location: 29 Mid Dural Road, Galston
Public Running: Second Sunday

Ulverstone Tas

Excessive rain this year has kept the site in a completely saturated condition. This did not mean that the club members sat back and did nothing. Driven by their enthusiastic president members have completed the club's new riding truck storage shed. The four pointed tracks leading into the shed have eliminated the awkward storage problems of the past.

The small membership does not reflect in the output of members. It is pleasing to note that there are six new steam and three diesel type locos under construction. At the time of reporting preparations were also under way for the 1996 Run Day and Exhibition on November 24.

North-West Model Engineering Society
Location: Maskells Reserve (2k. east of PO on Highway), Ulverstone
Public Running: 3rd Sunday

New Plymouth NZ

The driving of the "Golden Spike" a few weeks ago marked the conclusion of a major maintenance programme of the track. This was the removal of the plant mix from between the rails, chipping away the rust and filling between the rails with road chip.

Work has restarted on the restoration of McLaren 725, the club's full sized steam roller. Restoration work is also well under way on an Aveling & Porter traction engine of 1912 vintage owned by two club members.

New Plymouth Society of Model & Experimental Engineers Inc
Location: cnr. Gilbert and Liardet Streets, New Plymouth
Public running: Every Sunday

Bendigo Vic

The Woodvale 7¼" Electric Tramway is situated 12k north of Bendigo and is believed to be Australia's only passenger carrying model tramway with working overhead wiring. Steam and diesel electric also run on the one kilometre track. Membership is informal in that there are no rules except commonsense, safety and consideration of others. There are no membership dues and therefore members have no rights. Running is every weekend with week days by appointment. Contact is John Beckett (054) 46 1742.

Woodvale 7¼" Electric Tramway
Location: Jobes Lane, Woodvale
Public Running: Unknown

Durban South Africa

The AGM saw the election of a new Secretary, Gary Lambert and a few changes on the Committee. The balance of the executive remains the same. (The members must be happy). The past year has been very successful for DSME with enough revenue generated to pay contractors to build a public toilet, install a hot water supply both within and outside the premises, buy a new compressor, complete the anti-tip rail and maintain the property and railway to a good standard. A hydraulic lifting turntable has been installed and the introduction of a trackside controlled signalling system is well under way. A once a month mid-week Pensioners Work Day has been started to enable consistent progress to be made on the various ongoing projects. So far it has worked well.

Planning is well under way for the National Steam Meet in 1998 which will be hosted by DSME. This is the major event in the South African live steam calendar and this year was hosted by Pietermaritzburg MES with 28 locos from 12 societies in attendance.

Durban Society of Model Engineers
Location: Kellaway Hall, Hinton Grove, Virginia
Public Running: 2nd Sunday

Invercargill NZ

Southland SME has reached their 40th year and one thought is that they could hold celebrations to coincide with the opening of the new extension. Parts of the outside track have become misaligned due to the effects of ice during the Winter big freeze, not a problem many of our Australian readers would be familiar with!

Splinters seem to be having a resurgence of interest. Not the kind you get from a piece of timber but rather a 300mm long freesailing fun boat which was all the rage some years ago. They are of balsa construction and ideal for beginners.

Council has given consent for the new building and the site is being surveyed. The next step is the working bee to pour the floor so the builders can move in.

Southland Society of Model Engineers Inc
Location: Surrey Park, Invercargill
Public Running: Unknown

Mackay Qld

The Mackay members are about to embark on another building restoration project. A few years back they acquired the old Farleigh station building which was moved to their Planlands site and restored as a clubhouse. Now they have succeeded in acquiring the station building and signal box from Paget (a suburb of Mackay). The signal box will be used as such and will be located just to the south of the existing station building and the Paget station building will be located near the steaming bays where it will provide storage space and an additional toilet.

Mackay Society of Model Engineers Inc
Location: Muller Park, Planlands, Mackay
Public Running: 1st Sunday

Club Roundup contributions

AME is pleased to receive club newsletters for consideration in this section. Newsletters are often a good source of articles, which we appreciate all the more, but most of all they help us keep in touch.

It is often difficult to decide what to publish and what to leave out. and the task of selecting material for a wider audience takes a lot of time. Also, there is always the risk that AME will publish something that the club considers sensitive. Please help by sending a "press release" page with your newsletter, or highlight the items you think we could use. We'll give first preference to clubs that help us out this way.

bmc

Moorabbin Vic

From time to time one hears complaints that some clubs are only interested in locos... not so in SLSV. At a recent meeting the theme was models on the table. How's this for a line up: a part-built 0-4-0 battery electric loco, a *Metre Maid*, a tool and cutter grinder from the M.E.Workshop design, a plank-on-frame model of blue gum clipper *Harriet McGregor* built in Hobart in 1870, 5" gauge VR H class loco, 3" Burrell traction engine, a Blowfly chassis, a Winters s/c vertical marine engine and a 5" gauge gondola riding truck.

The new Char Bunker has been installed inside the tower structure of the pedestrian bridge. Originally a rectangular heating oil tank it has been divided into two compartments, one for medium char and one for coarse char. The next major project will be the replacement of the pedestrian bridge walkway.

Steam Locomotive Society of Victoria Inc

Location : 128 Rowans Road, Moorabbin

Public Running: 1st Sunday

Gisborne Vic

The recent AGM saw a new name for The Gisborne District Steam & Engine Society Inc. They are now known as The Gisborne Vintage Machinery Society Inc., a name which is not so much of a mouthful but still reflects what the Society is all about. The election of officers saw the president, secretary and treasurer returned with changes in some other positions.

Work on the Perry locomotive has continued to the stage where restoration is basically completed. On the 7¼" gauge, the passing loop past the station was completed and very effective at the rally. The club diesel loco has been rewired, transmission overhauled and an access door installed. The Ruston Hornby portable engine has had its tubes removed for replacement. All in all it has been a good year. Plans are well under way for next year's Gisborne Vintage Engine & Steam Rally to be held in May which will feature all types of machinery manufactured and distributed by A. H. McDonald & Co. as well as vintage vehicles and machinery, models, Perry No. 9 loco in steam, and the usual train rides.

Gisborne Vintage Machinery Society Inc

Location : Steam Park, Webb Cres, New Gisborne

Public Running: 1st Sunday of month

Edgeworth NSW

The Lake Macquarie workers have been kept busy. The dual gauge has been separated to separate the 5" and 7¼" steaming bay. This will mean that 5" locos will no longer run out of track by missing the point. New steel picnic tables are appearing all over the park and a new circuit has been installed in the steam shed for specific use by welders. More concrete has been poured at the 5" gauge station around Clarence Signal Box and the unloading area of No.1 platform. Displays have been staged at Maitland Steamfest and at the Model Railway Exhibition at the Richmond Vale Railway Museum at Kurri Kurri.

The Maitland Steamfest display included 28 locomotives ranging from 1¾" to 7¼" gauge, petrol and steam. There were also five stationary engines and two traction engines. A fairly wide variety of rolling stock in 5" set the display off nicely. The club also operated the portable track over the two days, giving 1700 rides with three locos officiating. LMLSLS have been presented with a Certificate of Appreciation by the Maitland Steamfest Committee for their support over the years.

Lake Macquarie Live Steam Locomo-tive Co-op Society Ltd

Location : off Velinda Street, Edgeworth

Public Running: Last Sunday except December.

Auckland NZ

A feature of club meetings which is a long standing tradition at ASME is the Bits and Pieces segment where members bring along their current project or some item of interest. Over the years there has been a vast and varied lineup of all manner of models and equipment. A recent example of the unusual was a metal spraying unit for zinc, and a partly made mould for a doll's head which had been produced by spraying zinc onto a carved master pattern. The spraying unit is basically an electrically heated pot in which zinc is melted, coupled to an air gun which blows the molten zinc through the air onto the master pattern in the same way as a paint spray gun.

Work on the electric loco trolleys progresses well. They are to be painted yellow with upholstered seats. The little club loco destroyed by vandals as reported some months ago is being rebuilt into a battery electric.

Auckland Society of Model Engineers Inc

Location : Petersen Road Reserve, Waipuna Road, Panmure

Public Running: Every Sunday

Model Engineering Association of New Zealand Inc.

MEANZ was originally set up under the name of National Association of Model Engineering Societies (NAMES) as the voice of the hobby in New Zealand in much the same manner as AALS in Australia. So far they have been making positive progress with government departments though the OSH "Amusement Devices" have taken up much time. At this stage the Australian AMBSC boiler codes seem to be in favour with OSH "Engineering Safety". Australian readers will be very familiar with what the Kiwis are now going through, and no doubt hope that commonsense will also prevail with the authorities across 'the ditch'.

Coming Events

11 January
Last run at Tullamarine

Join the crew of the Tullamarine Live Steam Society (Victoria) for a farewell run at their Springbank site. From 10 till late!

22, 23 February
5th Annual Invitation Run

Lake Macquarie LSLS 45th birthday
Off Velinda St. Edgeworth.

23,24 February
Open Weekend

Hamilton Model Engineers, NZ

1,2 March
Great Little Train Show

Invercargill NZ

8, 9 March
Open weekend, Taurunga NZ

Members of the Taurunga M&ME invite all model engineers to a fun weekend at their track in Memorial Park.

8,9 March
Scoresby Steamfest

1200 Ferntree Gully Rd, Scoresby

28,31 March
AALS Convention, Railway Park, Cobden Vic.

Contact Sec. Ian McArthur, 14 Peter Street, Cobden 3266 (055 951195)

17,18 May
Gisborne Vintage Engine & Steam Rally, Gisborne Steam Park

Open to public 10am to 4pm . Adults $5, pensioners $3 children under 16 free. Camp sites avail. Fri to Sun.

Features steam engines, vintage vehicles and machinery, models, train rides. Hot food and drinks avail.

17,18 May
***Sweet Pea* and *Blowfly* Invitation Run**

The SLSV Moorabbin, Vic.

5, 6 July
Bendigo National Exhibition

The Bendigo Society of Model Engineers are holding a national exhibition at the Leisure Centre, Kangaroo Flat. Organised by Events Bendigo. Further information from:

Peter Robinson (03) 5447 8667 or Events Bendigo, Stephen Cole, Phone: (03) 5444 4144, Fax: (03) 5443 4268.

8 to 12 January 1998
International Model Engineering Expo, Tauranga NZ

Model exhibition, hobby displays, working demos, road vehicles, railways 2½", 3½", 5" and 7¼" gauges.

Registration forms now available from:

Expo 98 Secretary, 326A Devonport Road, Tauranga NZ

Two Internal Combustion Engines on the Smell of an Oily Rag

By Paul Dutton

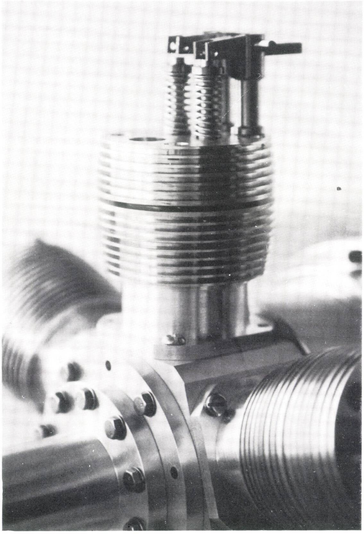
Photos by Wayne Langly. Drawings for publication by Neil Graham

I started these two engines — a five cylinder radial and a single cylinder — about a year ago. Although I haven't finished them yet, I thought it would be good to share my experiences with readers of AME who might like to "have a go" themselves.

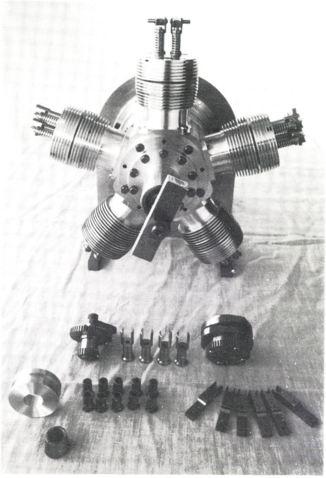
Internal combustion engines are challenging to make, and even more so if you want to make them for next to nothing. I didn't want to have to buy material, because I was unemployed. No one seems to want a typewriter mechanic of 20 years' standing any more, since computers have taken over, but a tight budget wasn't going to stop me building them!

I did not prepare drawings except for a few abstracts to see if the parts fit. The designs came "out of my head" as I went along, and my head was scratched a lot, I can tell you!

Projects like these can start in strange ways. I had built a small die casting die, and had taken it to a casting firm to see if it could be used. While waiting for their remarks on the die — which took them six months to come up with — I started on the five-cylinder radial engine.



A closer look at the master cylinder showing the roller rocker, the rollers hadn't been made at the time of photography.



The five cylinder radial engine. Gears, cams and roller rockers are shown in front of the engine.

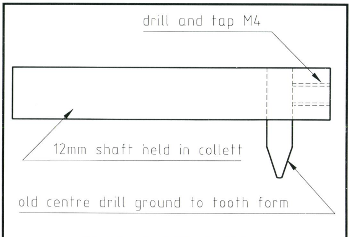
The five-cylinder radial

This engine is machined from solid aluminium with a bore and stroke of 33 mm x 33 mm, giving a total capacity of 141cc. A compression ratio of 8:25 maybe a bit high, but that is just the theory — I won't know the actual compression ratio until it is finished.

The crankshaft is made from solid S1214 steel. A jig had to be built to offset the crank so the crankpin could be machined in the lathe. The rear sub-shaft is pressed together. Cylinder liners are also S1214 steel, machined from solid. It may not be the ideal material: I would have preferred cast iron, but that's all I had at the time so the choice was made for me.

Pistons are aluminium, with two cast iron rings each. The rings are not split at the moment — there are a dozen ways to do the splitting, but I have developed my own, one of which I'll mention later.

The next challenge was gears. At first I thought I would have to get them made, then I thought about copying gears, so I found two Tamiya gears left over from my model car days. One gear had 50 teeth, the other 25. I ground a tool bit (a broken centre-drill) to match the tooth profile, and fitted it into a hole in a 12mm steel shaft which


drill and tap M4
12mm shaft held in collett
old centre drill ground to tooth form

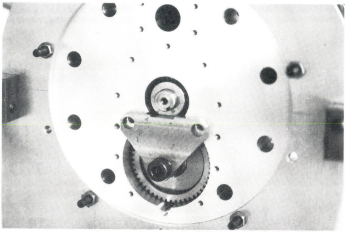
GEAR CUTTING TOOL

I had drilled and tapped to hold the tool. When fitted into the collet chuck in the milling machine, it worked very well.

The gear blanks were made to the same diameters as the Tamiya gears, again in S1214 steel. Dividing was done in the rotary table. I do not have dividing plates, so I had to go by degrees for each tooth: 7.2 degrees for the 50t and 14.4 degrees for the 25t .

This gave me all my gears. Now I know they don't have correct involute tooth form and are not perfect, but they look good and they work. I even impressed myself after making them — my father thought I had wrecked one of his geared electric drills!

Valves are 13.5mm diameter, with 5mm stems reduced to 4mm where they sit inside the port. Normal C type spring retainers are used; the springs came from local supermarket. Valves are 316 stainless steel — this is lovely stuff to machine in the lathe (even on my "heap"). I scrapped a few that were too loose — I wanted a tolerance of .01mm or .02mm under 5mm, and no taper.

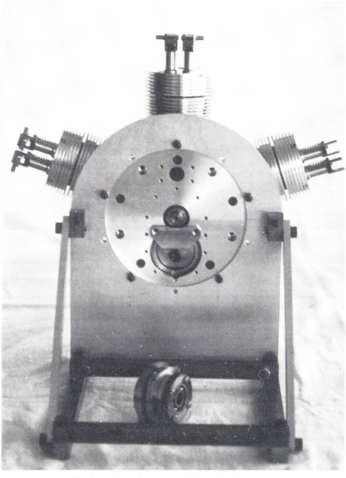


A closer look at the rear of the radial engine, the larger hole at the top is for the carburetor. The keyway in the centre shaft is 3mm x 2mm.

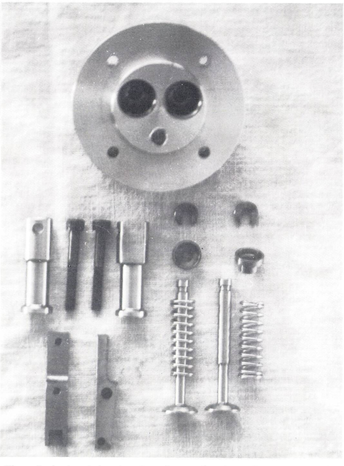
Drilling and milling 316 stainless steel is a different question. The rocker supports are made from this, and a HSS drill seemed to blunt the end. I asked a tool merchant what to use: "Try cobalt", he said, so I did. The 4mm drill cost $4, so I wonder if a 20mm would cost $20! And while machining the rocker supports, I burnt out a new 7mm end mill, but I did finish all of them.

Another challenge was the cams: I had no idea what the timing should be. I read books and books, and ended up machining two cam blanks which I clamped between rings on the gear assembly so I can adjust them when the engine is complete. When it is I'll let you know!

I made a jig to hold the cylinder heads for all machining operations to save time.



A view from the rear of the radial engine.



The cylinder head showing the valves and springs, C retainers, rocker supports and roller rockers.

Valve seat and guides are phosphor bronze pressed in.

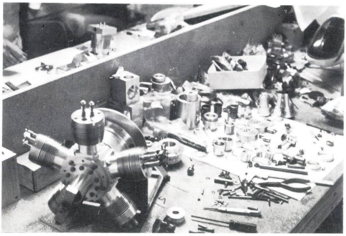
Master and slave rods, with two oil holes at the big and small ends, are aluminium machined on a rotary table. Cylinders liners 2, 3, 4 and 5 had to have a little material machined away to clear the rods, particularly 3 and 4, because of the different phase they take when going around. Dozens of little jigs were made to hold bits so some bits are interchangeable.

The engine will have roller rockers and roller cam followers, which can be seen in the photos. Roller cams and rockers may only suit high-performance engines, but after testing other types in a little test rig I made — which I could turn over by hand — I was surprised what a difference rollers made. So rollers it had to be! Also, thinking about the drive gears, I asked myself whether they would they be robust enough to handle the load — S1214 is a bit soft.

Layout of the engine is piston drive, the crankshaft which drives the sub-shaft going through the rear gear case. The gear on the end (see photos), fitted with a 2 x 3mm keyway, then drives another gear assembly 2:1. This in turn drives the cam gear assembly (2:1) which sits on the sub-shaft, giving a total of 4:1 ratio. This will hopefully drive the roller cam followers and rockers.

Making the keyway in the gear was done in the milling machine. A tool bit ground to 2mm was fitted into a hole drilled into a 6mm silver steel shaft, drilled and tapped to hold the tool, then fitted in a collet. The milling head spindle was fixed so it would not move. I centred the gear under the spindle; then by plunging the spindle up and down and moving the milling table in to the tool, I soon had a keyway. I have done this numerous times and it has worked all the time, even on a ¼" keyway.

The author working on the radial engine. This view will give you an idea of the size of this model.



When building a model such as the radial engine it is not long before a large collection of tiny parts begins to form.

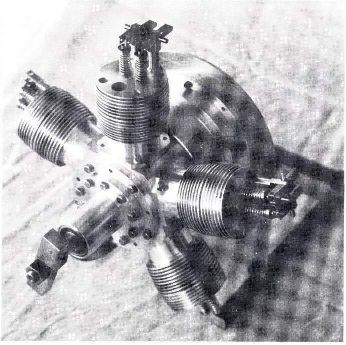
I still have a lot to do on this engine, such as machining the inlet and outlet ports, which are held up because of pipe. The problem was that I couldn't find thin-walled aluminium tube. Bending the normal 12mm aluminium into twisted S forms always flattened the outer diameter, and I never could get a small radius curve.

While I scratched my head over this, I started on the other engine. Then a friend said "Try corrugated bendable pipe", but he didn't know where to get it. I went to a plumber's supply shop, where they referred me to a business that had it — but only in 316 stainless steel again, and a metre cost $18. It is very light indeed, and can be bent to a small radius.

The carburettor is mounted on the rear. Fuel and air go in through the ports then into the gear case, lubricating the gears, then up through the inlet pipes (still to be made) and into the head. There are large passage-ways between the gear case and the crankcase so the rods and cranks get lubricated.

Further plans

At first the engine will be run as a glow-plug but my hopes and dreams are for it to run on spark. This of course calls for plugs, coil and



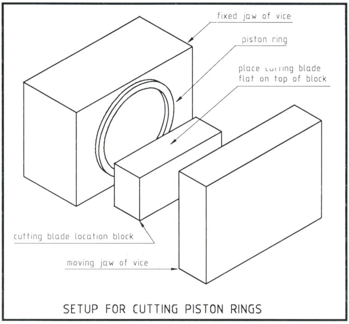
A general view of the engine. It is still not quite ready for firing!

distributor. A local model shop has 1/4 x 32t NGK plugs — but at $45 each. I hope to find some cheaper, or I will try making my own, which I have done some work on. Getting the ceramic insulator tubing is the problem: I will try moulding my own out of hobby ceramic.

At the moment the radial looks good, although you can see in the photos there are numerous small nicks and scratches here and there, which I don't like. I will try to remove these somehow — I have thought of making a de-burring machine. The finish on some of the steel and aluminium parts should be better — this is partly my fault and partly caused by my early Taiwanese lathe (19 years old) which has some very badly machined parts. You have to hit it and pray for it to be accurate. With some of the parts I made more than needed, just in case: in the end I have some bits left over, so maybe I'll make another engine out of these.

Splitting the rings

To split the rings, I get a small block of aluminium or steel that is half the diameter of the rings and fairly square. I place the ring blank up against the fixed jaw of a machine vice, then place the block up against the ring, get a sharp but solid modelling knife wider than the block, and place it on top of the block so it only aims for one side of the ring. Then, keeping fingers here and there to keep things steady, I *slowly* close the vice jaw. The blade will then slowly cut through the ring. It is so easy, you will get a bit of a crushing on the other side maybe and a burr or two but clean it up with a file and that's that! This has worked on my cast iron rings, which are relatively pliable — it may not work on harder, brittle metal.


fixed jaw of vice
piston ring
place cutting blade flat on top of block
cutting blade location block
moving jaw of vice

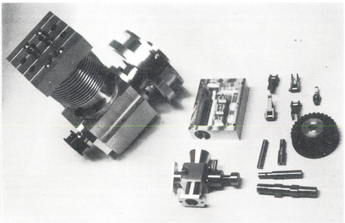
SETUP FOR CUTTING PISTON RINGS

The single-cylinder engine

As I said before, when I was thinking about the inlet pipes I started on another engine. It is 50cc, with bore and stoke 40 x 40mm. The crank shaft is machined from solid, the same as the five-cylinder radial. The cylinder liner is cast iron and the piston is aluminium with two rings.

The single-cylinder engine is belt-driven with a single overhead cam, and of course roller rockers and roller cams. (Looking down the oil filler on my father's Hyundai Sonata, I saw that it too has roller cams. I was going to remove the cam shaft covers, but he didn't like that idea — he's thinking of putting a lock on the bonnet).

One of the photos shows the partly assembled engine carburettor camshaft and roller rockers. The cylinder head and crankcase are made of 7075 aluminium, which is lovely to machine: it seems to have a brittleness about it and machines to a bright finish all the time. Another photo shows the dismantled carburettor throttle barrel (18mm diameter in the main body) then the fuel chamber and the needle valve.

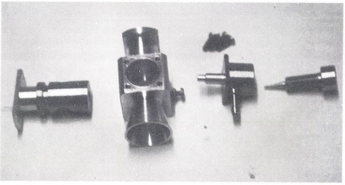


The 50cc engine, carburetor, roller rocker and cams. Also shown is the pulley and camshaft. pulley and cam-shaft.

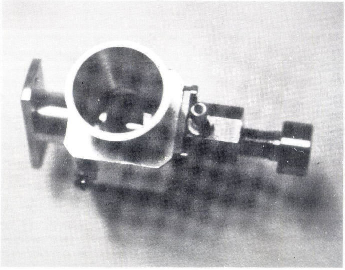
What you end up with

Both engines look a bit stodgy to me — too squared off and maybe not technically correct, but you can never tell what you will end up with when you design things from scratch. I wanted the radial to look a bit old-fashioned, with rockers and push rods sticking out all over the place. I don't think you would find a modern radial with overhead cams and electronic ignition fuel injection etc.

Possibly when these engines are finished, I may start on an in-line four-cylinder with supercharger, overhead cams and roller rockers. Or maybe a Rolls Royce Merlin, or a Napier Lion with three banks of four cylinders — although I heard that Mr Blackmore of Bentley BRII fame was working on this. My real wish is to build something that no one has already built. Maybe a three-rotor radial aircraft engine. Or maybe ... Hold on — where's that lump of 7075 ... !



The carburetor components for the 50cc engine.



Looking down the business end of the 50cc engine carburettor.

Drills and Drill Sharpening

by Stuart Daniels

Drill sharpening is one of the most difficult processes that a fitter has to learn and it is very difficult to describe how by the written word, and I'm not going to try. I have included a diagram of a conventional morse tapered shank drill, a straight shank or jobber drill uses the same terminology. The descriptions in figure 1 might help you to understand the guidelines on resharpening your drills.

The other drill point forms that I have included in this article are very useful in our hobby — you will probably encounter a use for each one!

Drilling brass or bronze

One of the problems you might encounter is that the shape of a conventional drill point will cause it to dig-in on brass or bronze — often pulling the drill deeper into the material. This is easily prevented by grinding the leading edge of the drill face along the lip length with a zero rake angle. The amount that you need to grind the edge back by is minimal and does not need to be as much as is illustrated in figure 2. Hold the drill vertical and touch the drill face on the side of the grinding wheel to give it a small flat land.

Drilling sheetmetal

The next type of drill is a sheetmetal drill which is very handy when you are drilling sheet copper, such as boiler tube plates. This point form (figure 3) is not easy to sharpen — you might need to have a couple of goes to get it to work properly. I usually try it out on a scrap piece before the real thing. The centre point needs to be ground to a point so as to cut into the sheetmetal before the outer cutting edges make contact with the metal. The sharp point makes this type of drill easy and accurate to locate because the point nestles well into the centre-pop marks.

A sharp grinding wheel with a good square corner makes sharpening the sheetmetal point form a lot easier.

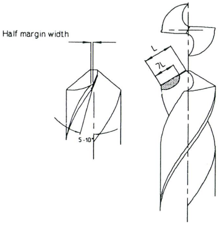


Fig 2. Zero Rake Drill Point

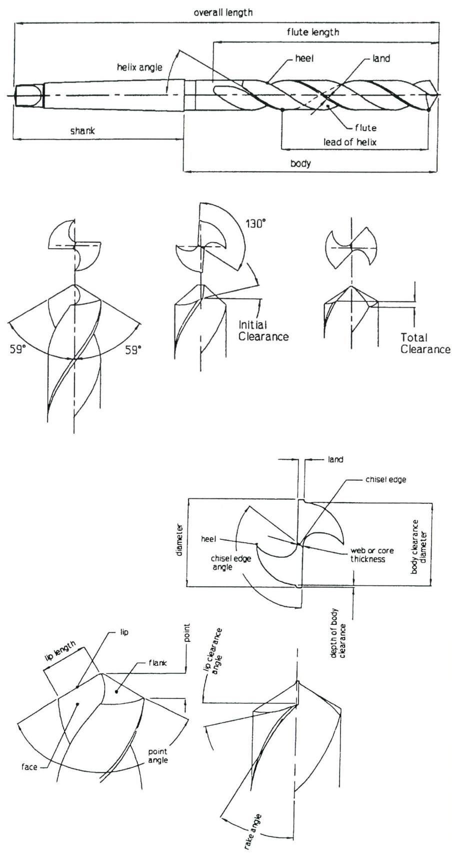


Fig 1. General Twist Drill Geometry and Terminology

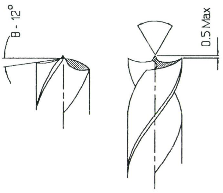


Fig 3. Sheetmetal Drill Point

Flat bottom holes

Flat bottom drills are a must when you are making clack (check) valves etc. I grind the drill flat first, then grind the clearances on after. Back clearance has to be ground on it to enable it to cut. Again, I always try it on a scrap piece before using on the main article. If you have not used one of these drills you may not be aware that you must first drill the hole with a conventional drill to its full diameter and near to full depth before trying to use the flat bottom drill, otherwise the flat bottom drill will stagger off all over the place. I always keep a separate collection of flat bottom drills as well as the conventioal drills, this saves me sharpening them each time.

Stitch or chain drilling

If you do not have a milling machine and have to drill holes that overlap, to cut out material, a stitch drill will be a big help to you, see figure 5. It's a flat bottom drill but with a pip in the centre to engage with the material first to stop it from wandering or deflecting into the previously drilled holes.

Centre drills

The center drill is used to enable more accurate location of the twist drill, and to assist in starting the drill in the correct location — particularly when drilling in the lathe. They come in a variety of sizes from the small No. 1 at ⅛" diameter to No. 8 at ¾ diameter. Keep the centre part sharp and the revs up high and you won't have any problem with them. If you work out the revs you will find that the slowest you run them at is 1000 revs/min.

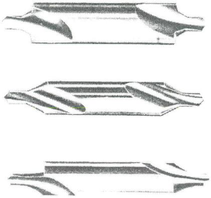


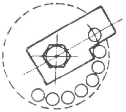
Fig 6. Centre Drills

If you break a tip off inside your job it means starting again as you cannot drill it out as it is very hard, and usually if you try to dig it out the job becomes damaged too badly anyway.

Of the three illustrated in figure 6, the centre one is the one that you have most likely seen. The lower one, which has a curve on its lip, is fairly rare.

Web thinning

This is a process you may need as your sharpening skills accelerate and your twist drills are getting shorter. The normal twist drill web is tapered thicker towards the shank.



A handy drilling jig for radial chain drilling

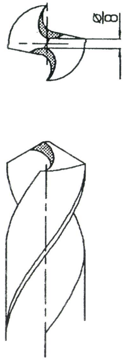


Fig 7. Web Thinning

As the drill gets shorter, the web becomes wider, so you'll need to grind back the web from time to time. Figure 7 shows you how.

Cutting speeds

Having perfected the art of sharpening you may appreciate the need to preserve the cutting edge — to avoid resharpening after every use! Find a cutting speed chart you are comfortable reading and use it. Speeds vary according to the type of material being drilled and the diameter of the drill bit.

The following simple calculation may also be used.

$$n = \frac{300v}{d}$$

Where n = revs/min; v = cutting speed in m/min; d = diameter of drill in mm (in the case of centre drills a diameter about half way along the 60° taper should be used).

As a general rule of thumb, the larger the drill bit, the slower the speed and vica versa.

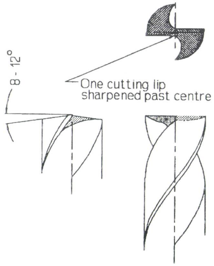


Fig 4. Flat Bottom Drill Point

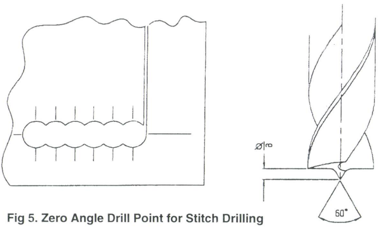


Fig 5. Zero Angle Drill Point for Stitch Drilling

Tracks 'n' Trees

Welcome to a new column for 1997. Tracks 'n' Trees is about garden railways — we have had several articles related to this fascinating subject over the years and now the following is strong enough to formalize a place in AME. The main contributor will be Paul Trevaskis, Paul will have a lot of help from Gary Warton and his *Rails in the Garden* publication as well as guest contributors. Because the names and quantity of contributors will vary with each issue the contributors name will precede their section.

Most of the model locomotives that feature in this section are live steam. However, as in the larger gauges, there is a tendency towards non-steam locomotives — these will be included as well.

I would like to congratulate Gary Warton for taking the time to produce his excellent publication *Rails in the Garden*. Gary has also gathered a band of followers as an informal group. The group can be identified by a distinctive uniform — a dark green apron emblazoned with the logo **Rails in the Garden**. The group put on a display with a portable track on 9 and 10 November at the Campbelltown Steam and Machinery Museum NSW. (*Queensland doesn't have a monopoly on steam museums Dave!... ed*). The big shed at the museum came in handy because the portable layout is 11 metres long and 6 metres wide!

Paul Trevaskis

Brisbane garden railway group

Over the last few years there has been renewed interest in the smaller gauges and scales ie. gauges O and 1 in half inch and 16mm scales. There are groups established in all capital cities except Brisbane and surrounds. However I have had letters from two gentlemen recently who are looking for track. So if anybody in the Brisbane area is interested any inquires would be greeted with open arms. There is something about "Watching the trains go by" in good company. Also by getting together track can be bought at a reasonable price. All letters via the editor please.

Track spikes

Laying your own track has always been the most cost effective method for the gauge 1 and O gauge garden railway. The rail has always been available however track fixing has been a problem as there were no proper track spikes readily available locally. Argyle locomotives have solved this problem with the production of steel spikes with a flat offset head. The spikes are 9mm long 1mm thick and the head is 1.5mm diameter They grip well into soft wood and will seize solid with time outdoors. They are available in half kilo bags, which is about 5000 spikes, for $10 plus $3 postage anywhere in Australia. The address is: Argyle Locomotives, 241 Belgrave - Gembrook Rd. Clematis, VIC, 3782.

From *Rails in the Garden*

Gardening Tips

by Michael Bickford

Some notes on successes to date in the horticultural side of things on the Berowra & Nalya Tramway, looking at Australian native miniature trees in particular. Remember that the climate and soils are probably different in your area so you may have different results to me.

In order to set the scene around our railways in the garden we need to try and miniaturize the plants in the immediate vicinity of our trains Background plants can be larger, however overall appearance and perspective are important. My aim has been to try and achieve an Australian appearance to my railway however it is not that easy. The search continues for a miniature eucalyptus (or Gum) tree. Size is all relative — a 20 metre high tree in 16mm scale is about one metre tall.

I have discovered that there are some miniature Australian native shrubs being cultivated and available to try as garden railway size trees. They may need some trimming to expose the trunk and make them more tree-like as they grow.

Baeckea Virgata (Dwarf Form) 0.3m high, 0.5m spread.

Dense little shrub, olive green foliage with white flowers in summer, sunny or part shade, very hardy. Grows rather flat-topped but is readily available and almost indestructible in my garden.

Melaleuca Incana (Dwarf Form) 0.5m high, 0.5m spread.

Compact dwarf shrub, soft foliage, frost resistant, yellow flowers in spring (maybe)Susceptible to summer humidity burn-off of the leaves in Sydney area, but does recover.

Melaleuca Thymifolia (Cotton Candy) 0.3m high, 0.3m spread.

Compact dwarf shrub, mauve/purple flowers spring to summer, frost resistant, very hardy, will tolerate boggy positions. Exquisite little jewel of a shrub that seems to thrive in Sydney. I Have found it in a number of nurseries.

An indoor garden railway! Jack MacMicking (far left) and Gary Warton (next to Jack) discuss the finer points of small scale steam to very interested onlookers at the recent Campbelltown Steam and Machinery Museum's Expo weekend.

Some other non-native shrubs to try. *Pittosporum* (green globe) 0.5m high, 0.3m spread Small, green tree-like shrub Chinese Elms.

Various small leaved shrubs, especially *Hokkaido* which has leaves about 3 to 4mm long and grows about 0.3m high.

Where to get them

Locating some of these plants can be hard but specialists such as Bonsai nurseries can provide some little jewels. The *Baeckea* can quite often be found in places like Coles, for as little as $2.00 for a baby plant 50mm high, which will grow quickly to maturity. I have found many interesting plants at Parry's Native Nursery on the Woy Woy road at Kariong near Gosford NSW.

Good gardening.

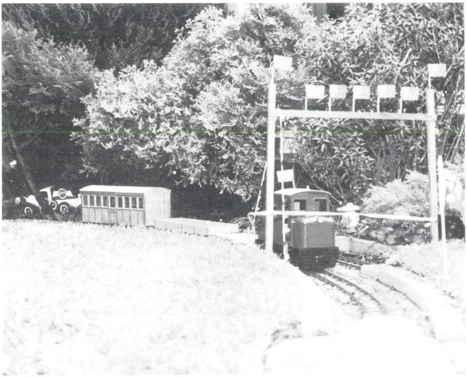
Brian Carter

While on the subject of Michael Bickford's Berowra & Nalya Tramway I would like to share a special event. On 26 October 1996 the B&NT was officially opened!

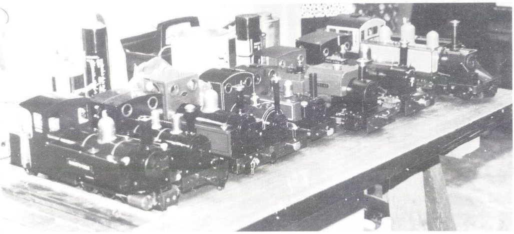
I must admit it was the first time I had been to the opening of a garden railway — and I hope it won't be the last. There was a real family atmosphere: the large number of garden gauge modellers and their families who came to join the festivities gave me the impression that this was a special band of modellers. The back yard space wasn't like the large areas I am used to at the larger gauge meets, but everyone had plenty of room to move about.

Michael's 32mm (0) gauge railway is mainly for locomotives of 16mm to the foot scale. Although any scale of loco that can run on 32mm gauge would be okay. The track follows along the back and down one of the side fences then meanders through the yard in a roughly triangular shaped layout.

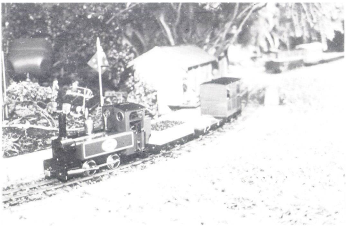
Congratulations on your achievement and may you have many years of enjoyable railroading on your tracks in the trees.



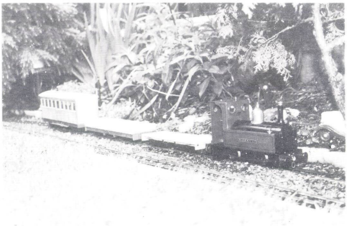
Michael Bickford's battery-electric loco and train ready for the ribbon cutting ceremony. Michael's wife cut the ribbon at high noon to mark the official start of railway operations at the Bickford household..



An impressive line-up of 32mm narrow gauge live steam locomotives on the "steaming bay".



A Mamod® live steam loco fitted with radio control gear heads a goods train through the station.



***Marmaduke** leads a mixed goods through one of the more formally sceniced parts of the line.*

The MPS Digital Readout

Story and photos by Brian Carter

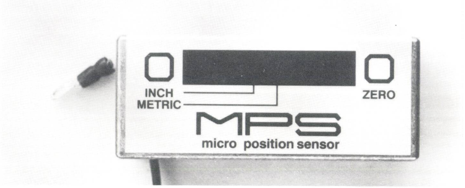
This started out to be a simple review of an interesting product that I hinted at a few issues ago. As you can see it has grown into a workshop article of almost epic proportions! I'd like to share what I found with the Micro Position Sensor (MPS). The standard MPS ($415 incl. post) has a five digit and minus sign position display with a maximum measuring range of 400mm or 16" and a display resolution of 0.01mm or 0.001". The enhanced MPS (EMPS) ($450 incl. post) has a six digit and minus sign display with a maximum measuring range of 500mm or 20" and a display resolution of 0.005mm or 0.0002". It is possible that by the time you finish reading this story, the cost will be irrelevant.

The photos and captions describe how I fitted the MPS unit to two machines in my workshop. The article text describes the MPS unit and a few ways you can use it.

What is an MPS?

The Micro Position Sensor is a digital position readout that will give an easy-to-read measurement on a single axis of a wide variety of machinery. The MPS makes graduated dials, and allowing for backlash, redundant. If you have ever enquired about the "standard" industrial type of digital readout system for your machinery you will find that you have to outlay $2500 to $3000 or more for a two-axis system (even more for a three-axis unit) and you'll need one fitted for each machine you have! With the MPS unit you can start with one and add more as funds and needs permit.

I'll show you how you can get by with one MPS unit, but two units would be highly desirable as most work involves tools or work pieces moving in two directions. Because of the flexibility of the MPS, two units would give you all the measuring capability you are likely to need.



(1) The Micro Position Sensor. Note the inch/metric and zero "buttons" on the membrane cover. An important space saving feature is the method of measuring, using an extendible stainless steel wire (left), similar in principle to a tape measure.

Warning

The MPS is not a toy — this British made product has been precisely engineered and has stood up to a few mishaps quite well. A word of warning though — *Don't let go of the wire* if you have it extended — I did and the result is not a pretty sight! The unit had to be dismantled to unravel the wire from the winding drum. I was present when it was dismantled and was very pleased with the construction of the "working parts". You shouldn't have a problem if you treat it well.

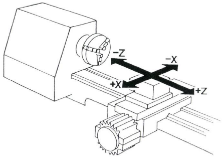
Some features

The LED readout of the Micro Position Sensor is automatically updated as the axis is moved. The most common use for the MPS would be the X and Y axis of a milling machine table or the X and Z axis of a lathe. The idea is to install the MPS and ignore the graduated dials of your machines. The problems of backlash and/or localized wear no longer exist as there is a direct connection between the stationary and moving parts.

The coordinate system on NC-machines

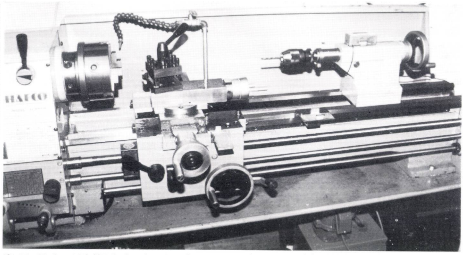
Since the MPS brings you to the fringe of numeric control technology, it would be good to gloss over the coordinate system. At least it may help you understand why the negative symbol display is part of the MPS readout. Numeric Control (NC) is a system where the machines are usually equipped with digital measuring displays and tool movements are controlled by something other than a human (e.g. Computer Numeric Control — CNC). I suppose you could say that machines fitted with an MPS would be MNC — Manual Numeric Control!

The instruction "move the longitudinal slide in the direction of the headstock" is a very long one. Besides that, in each language it would be different. That's why the traverse path movements with machine tools are described within the coordinate system.



Coordinate system on lathes

- Z-axis = Axis parallel to the turning axis
- X-axis = Axis perpendicular to the turning axis
- -Z movement = movement of longitudinal slide in the direction of the headstock..
- +Z movement = movement of the longitudinal slide away from the headstock
- -X movement = see drawing



(2) My Hafco AL960B lathe showing the mounting locations of the MPS unit. 1 - cross slide (X); 2 - longitudinal travel — variable position clip to saddle (Z); 3 - tailstock.

Help! Are we on the right track?

To help us to plan ahead, we need to know what you think about the magazine — especially if you only buy AME occasionally, or aren't in a club, or have never written to us or spoken to us at a model engineering activity. Would you kindly read the background briefing in the *Newsdesk* page and spend a short time completing this questionnaire? It's post-free in Australia, and we guarantee complete privacy.

About AME and other magazines

1 AME is published every two months. How many issues out of the last six do you have?

☐ 6. ☐ 5. ☐ 4. ☐ 3. ☐ 2. ☐ 1. ☐ None.

2 How did you acquire the current issue?

☐ By subscription. ☐ Bought from a newsagent (bookstore in NZ).

☐ Other: ______________________________

3 If you bought this issue: was there anything on the cover that prompted you to buy it?

____

4 Do you sometimes give or lend your copy to someone else? ☐ Yes. ☐ No.

5 Do you read any other model engineering magazine? ☐ Yes. ☐ No.

6 *If "Yes", please answer the next two questions* ☛ ❶ I read *all or most issues* of:

☐ Engineering in Miniature. ☐ Model Engineer's Workshop.
☐ Model Engineer. ☐ Modeltec. ☐ Live Steam.

7 ☛ ❷ I *occasionally* read issues of:

☐ Engineering in Miniature. ☐ Model Engineer's Workshop.
☐ Model Engineer. ☐ Modeltec. ☐ Live Steam.

8 Did you know that all aspects of AME — other than printing and distribution — are carried out by unpaid volunteers? ☐ Yes. ☐ No.

9 Did you know that authors of AME articles are also unpaid? ☐ Yes. ☐ No.

10 We encourage a spirit of mateship or "all in the family" in AME, rather than the more formal atmosphere of some other magazines. Do you notice this? ☐ Yes. ☐ No.

11,12 If "Yes", do you prefer the informal approach? ☐ Yes. ☐ No. Any comment?

____

13 Over the next year, do you think you will be:

☐ continuing your subscription to AME? ☐ letting the subscription lapse?
☐ buying AME more often? ☐ buying less often? ☐ about the same?

About you

14,15 How old are you? ______. Sex: ☐ Male. ☐ Female.

16 Are you in a model engineering club? ☐ Yes. ☐ No.

17 Please write in your postcode (or country if you don't live in Australia): ☛ ☐

18 Which work-life category would you place yourself in?

☐ Student. ☐ Retired. ☐ Not in the workforce, for a reason other than retired.
☐ Working, do not have dependent children. ☐ Working, have dependent child/ren.

19 How long have you been in model engineering? ____ years.

20 If you have any occupational background related to engineering or model engineering, please describe it here: ______________________________

21 How would you describe your level of enthusiasm for model engineering?

☐ Dabbler. ☐ Keen but inactive at present. ☐ Reasonably active. ☐ Very active.

22 Other (please describe): ______________________________

23 How would you describe your expertise in model engineering?

☐ Beginner. ☐ Variable, but expert in my field. ☐ Reasonably expert.

24 ☐ Advanced. *Tick in addition if this applies* ☛ ☐ Involved commercially.

25 Averaged over the last year, how much time do you spend on model engineering *each week*? (if it varies, please still try to give a rough "guesstimate"): _________ hours.

26 Answers to the next question may help us to attract more general advertising and keep down the cost of AME. How much money did you spend on model engineering *in the last 12 months*? $___________

27 Do you own at least one *completed* example of any of the following? [*Please see notes on strict privacy.*]

☐ Loco. ☐ Traction/road engine. ☐ Stationary engine. ☐ Boat.

28 Tick if you built it ☛ ☐ ☐ ☐ ☐

29 Are you *currently building* any of the following?

☐ Loco. ☐ Traction/road engine. ☐ Stationary engine. ☐ Boat.

30 If you ticked "loco" in any of the last 3 instances, please describe it by ticking as many of these boxes as necessary (if you own more than one, please describe the other(s) in the margin or on a separate sheet):

31,32 ☐ 5" gauge ☐ $7\frac{1}{4}$" gauge ☐ $3\frac{1}{2}$" gauge ☐ garden railways ☐ Other: ___________

33,34 ☐ Steam. ☐ Petrol. ☐ Electric. ☐ Standard or broad gauge. ☐ Narrow gauge.

35,36 ☐ Freelance. Prototype: ☐ WA ☐ Qld ☐ S Aust ☐ Vic ☐ NSW

37 ☐ NZ ☐ USA ☐ UK ☐ Other (please specify): ________________________

About your hobby interests

38 What is your main field of interest? ____

39 What is your secondary interest, if any? ____________________________________

40 How would you describe your attitude to topics in AME that fall outside these interests?

____

41,42 Do you have an interest in a hobby to some extent related to model engineering (for example, HO scale model railroading, wood-turning, technical aid for disabled people)?

☐ No ☐ Yes (please specify) ☛ ____.

43 Please tick any of the following that you own: ☐ drill press ☐ bench grinder

☐ welding equipment ☐ lathe ☐ milling machine ☐ computer.

44 How many model engineering projects did you start in the last 12 months? ________

45 Describe the main ones briefly (e.g., pendulum clock; lathe accessory; signals for my club):

____

____

____

About the content of AME

46 Which best describes your reading of the last three issues of AME?

☐ I read AME virtually cover-to-cover. ☐ I read only what interests me. ☐ I skim through.

47 Do you usually read through the adverts when you first read AME? ☐ Yes ☐ No.

48 If someone asked "What's the best thing about AME?" what would you immediately say?

____

49 What would you immediately say is the worst thing about AME?

____

50 Which of these issues of AME do you have right now?

☐ Nov-Dec 96. ☐ Sep-Oct 96. ☐ Jul-Aug 96.

Important: Please thumb through these issues (or the last three that you have) before you answer the next question: we want your answers to be based on a current review of AME rather than memories of what has been in recent issues. If you haven't the time, please skip this question.

51 After reviewing them, please tell us which 3 articles/columns/items you liked best in those 3 issues:

Best: ____________________

Second best: ____________________

Third best: ____________________

FOR YOUR PRIVACY!
We have put this panel here to safeguard your privacy. If you choose to put your contact details on the other side of this page, we will immediately cut out that segment after recording on it the basis for our future contact with you. In that way, any details you have given of equipment you own, etc, will be totally anonymous.

52 What level of competence should AME generally assume in articles?

☐ A mix, as at present. ☐ Have more simple/beginner items and fewer advanced.

☐ Have more advanced items and fewer at simple/beginner level.

53 With respect to workshop tips and "quick and easy" items, should we:

☐ keep them as at present? ☐ have fewer? ☐ have more?

54 Do you like to read articles in long construction series, such as the recently concluded articles on the 422 Class diesel? ☐ Yes. ☐ No.

55 *If you are willing to look back through the 1996 and 1995 issues, please do so*, then tell us:

☐ The 1996 issues were better than 1995 ones.
☐ The 1995 issues were better than 1996 ones. ☐ The standard is about the same.

56 Any observations on trends/content over the last two years?

____

____

____

57 Any other comment about AME? Attach a separate sheet if you prefer.

____

____

____

____

58 Please nominate an article topic you would like to see in AME:

____

____

____

Please note: The next question is to assess how many *potential* authors/topics we have, not to ask you to write something for us now. In fact we will *not* contact you unless you tell us to by ticking this box ☛ ☐ (If you ticked here, remember to write your contact details when asked on the next page).

59 As you know, AME contains items appealing to beginners and long-time readers alike, ranging from major series, through stories of about a page, down to one-paragraph tips. Is there a topic you think you might write about at some stage? ☐ No. ☐ Yes ☛ possible topic(s) are on next page:

60

61 We want to find out whether readers would be more likely to contribute an item if we helped them to prepare it. If you responded "No" to the last question, might you change your mind if someone with writing or drafting skills could work with you? ☐ Yes. ☐ No. ☐ Possibly.

Would you like us to send a free guide on writing an article? ☐ Yes (write your address below). ☐ No.

62 ***If you want to provide your name, address and phone number, please do so here:*** ☛

(If we need to get back to you, we may not be able to do so right away; please bear with us).

Thank you very much for taking the time to write down your opinions!

…… *Fold here; seal with adhesive tape or staples.* ……

…… *Fold here* ……

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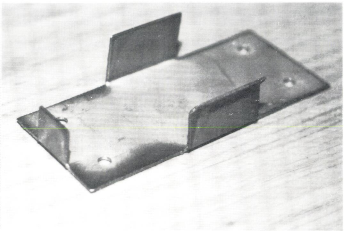
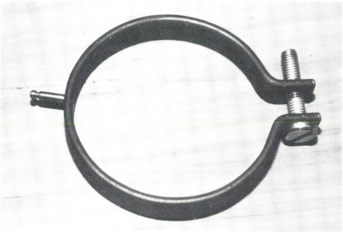
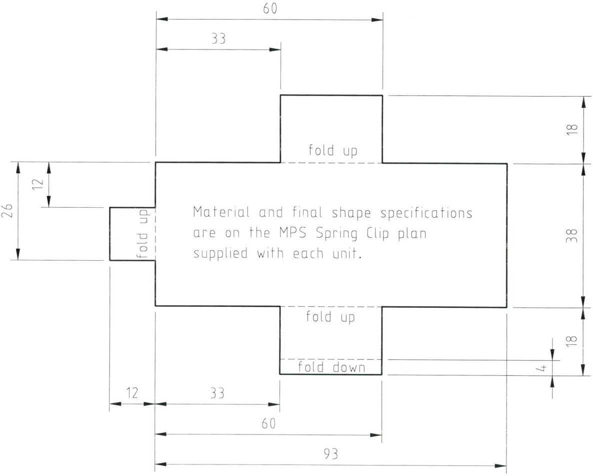


(3) A home-made MPS spring clip. I made seven of these out of 18 gauge zinc-anneal sheet. The drawing supplied with the MPS specifies stainless steel — I used what I had. The clip seems to work okay.



(4) A collar made from 13 x 3mm mild steel with a 3mm diameter pin to attach the MPS cable. Note the groove at the tip of the pin, this keeps the cable ring in place. The design is the same for the tailstock spindle and the bench drill quill. The internal diameter varies to suit the machine.



Material and final shape specifications are on the MPS Spring Clip plan supplied with each unit.

MICRO POSITION SENSOR SPRING CLIP DEVELOPMENT

- +X movement = see drawing

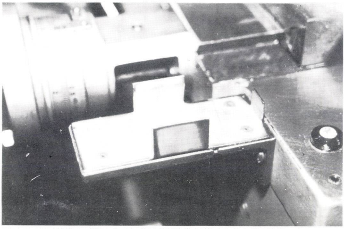
I should mention at this point that the usage of the X, Y and Z axis in this article is the general relationship. There are instances where the relationship of axis identification is different.

Number of MPS units required

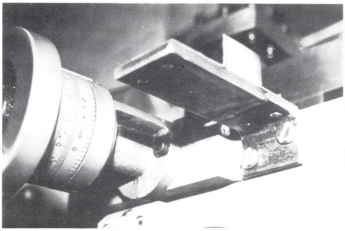
Situations such as lathes and milling machine tables where two axes are in constant use, I would strongly recommend two MPS units. The beauty of this system is you can start with one and get the other one when you are tired of swapping it between X-Z (lathe) or X-Y (Mill) axes.

At the very most — two units will cover every machining operation you would have. Even on a mill, the Z axis (cutter depth) is rarely used in conjunction with the table cross or transverse movement. This will allow you to use one of the table MPS units to set the depth of cut and revert to table use.

As mentioned earlier, the dedicated digital

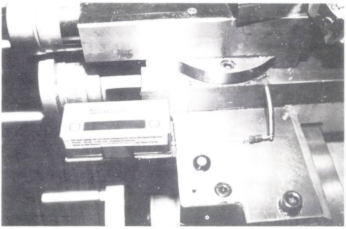


(5) The MPS clip and bracket for the lathe cross slide. 30 x 30 x 6 x 40mm long angle iron with a 65mm length of 40 x 6 flat steel, welded to one leg of the angle iron to form a bracket. The clip was pop riveted to the bracket.

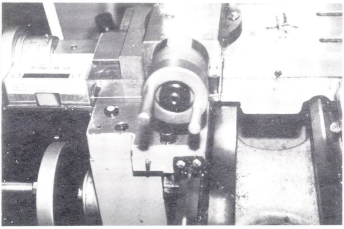


(6) The MPS clip and bracket for the lathe cross slide viewed from below. The bracket is attached to the saddle by two M6 screws. The saddle is usually solid cast iron at this point, so it is easy to drill and tap. These two blind holes are only 10mm deep.

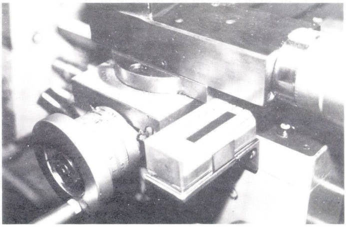
(7) The cross slide MPS cable pin. This was made up from 6mm diameter steel. The end was turned down to 3mm diameter for about 6mm long. A small groove about 1mm deep was put about 3mm from the end. The groove prevents the MPS cable from slipping off. The cross slide was drilled and tapped M6. Note: the hole was drilled high on the cross slide to miss the adjusting gibs in the vee ways.



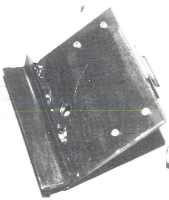
(8) The MPS in place on the cross slide. The compound slide has been swung out of the way to give you a clear view. The cable pin has been bent down to ensure the cable is kept in a parallel plane to the MPS unit.



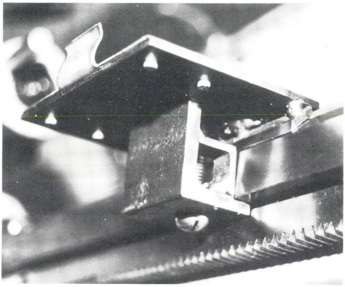
(9) The compound slide in its normal position. The MPS cable has some protection from swarf and coolant splashes with the overhanging compound slide. With the cable pin just below the edge of the compound slide it is accessible for cable removal and replacement. It also leaves the saddle area open for the tailstock to go up close to the cross slide.



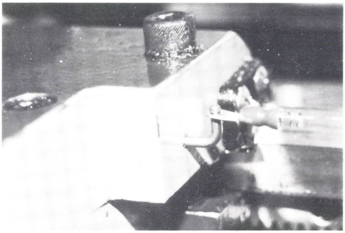
(10) This is an area that requires careful thought. I only have about 0.5mm clearance between the top of the MPS and the underside of the compound slide. The cross slide is wound out to its full extent to check clearances. If you don't have enough clearance on your lathe you can overcome the problem by fitting the MPS further out from the saddle. Make sure you have sufficient clearance when setting angles on the compound slide.



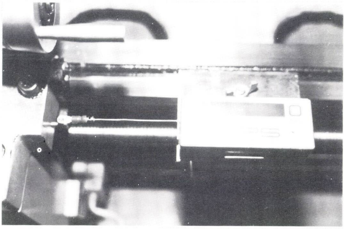
(11) The long bed of the AL960B lathe required a sliding MPS clip to keep the cable travel within the 400mm limit. The inverted components of the sliding clip bracket are shown in this view. The top plate (left) uses a piece of 25 x 25 x 3 angle iron to slide on the lathe bed vee. The angle is welded to a piece of 75 x 3 mild steel. The clamp is fabricated from 30 x 30 x 6 angle and 25 x 25 x 3 angle is used for the support piece. The M8 screw and wing nut locks the clamp.



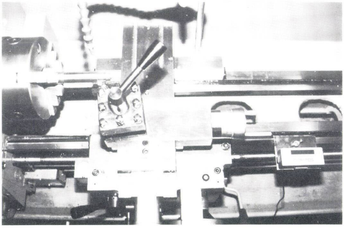
(12) The sliding MPS clip mounted on the bed. The MPS clip is pop riveted to the bracket. The head of the screw should be tack welded to the clamp to prevent rotation when using the wing nut.



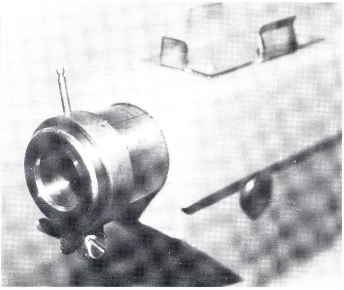
(13) A close look at the cable pin for the longitudinal measurement. The 3mm diameter pin is threaded, and screwed into a hole tapped M3 in the saddle. This pin has a small groove machined near the end. Make the clip bracket first and mark out the saddle pin location with the MPS in its clip.



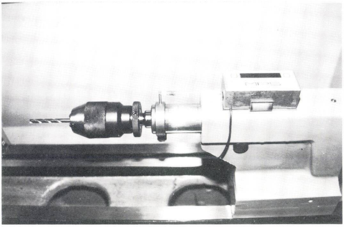
(14) The arrangement for longitudinal measurement with the MPS.



(15) A tall operator's view of the Z axis MPS readings used to measure shoulder lengths for parallel turning. Its best feature is in locating the bottom of blind bores and internal screw cutting. Both MPS mountings are located on the right-hand side of the cross slide to protect the MPS unit from swarf and coolant.



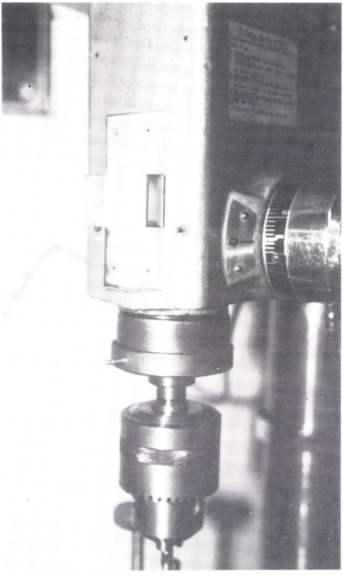
(16) Drilling counterbores and flat bottom holes in steam fittings begs for an MPS on the tailstock. The pin collar on the tailstock spindle is removable to allow the use of a lathe attachment I might write about one day. The MPS clip is pop riveted to the tailstock casting. Hint: remove the spindle before drilling the holes!



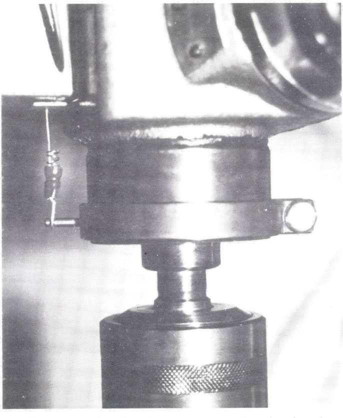
(17) A general view of the tailstock setup. A flat sharpened twist drill is in the chuck ready to counterbore a hole to "exact" depth in millimetres or inches. A D bit would at home here also.

(18) A small diversion — while checking the accuracy of the MPS I snapped this view of my Diamond lathe tool taking a 6mm deep cut. It's used to this kind of treatment! I like the diamond tool for three reasons: 1. It is quick to set up. 2. It is foolproof and quick to sharpen. 3. It can handle a cut depth to the full length of its cutting edge with the greatest of ease. The slightly higher price of these lathe tools is quickly repaid with improved productivity. I know I don't have time to waste, and if you're retired, I'm sure you don't want to waste time either!

(The Diamond Tool Holder is a regular advertiser in AME)



(19) It occurred to me with the tailstock setup that it could be duplicated on the bench drill. This pin clamp (see photo 4) is the same design as the tailstock spindle clamp. I had to remove the manufacturers plate from the front of the machine to allow the spring clip to sit flat against the casting.



(20) A closer look at the cable pin attachment (see also photo 4).

readouts have two axes for each machine — a very expensive proposition!

The Spring Clip

The drawing included in this article should be close to full-size (after printing) so you can either mark out yours directly on the material or photocopy this page and glue it to a sheet of material of your choice and cut around the lines.

Uses of the MPS

Milling machine

The MPS can be fitted to the transverse slide, cross slide and quill or knee slide. One unit swapped around to the three positions would get you going, but two would be ideal.

If you have a milling machine with a long table travel such as a Bridgeport®: a useful trick would be to set the travel or positive stop on the table to prevent pulling the wire out of the MPS unit. A sliding clip as used on the AL960B lathe should be used, but I would still set a travel stop.

Lathe

The MPS could be fitted to the cross slide, saddle and tailstock.

Spotting holes

When drilling in the milling machine, locating the pitch of a series of holes is easy.

Internal work

Using a boring bar in blind holes will not be so difficult when you can easily see the depth measurement on the MPS attached to the lathe saddle. Determining the internal diameter would not be so difficult anymore.

If you are screwcutting an internal blind thread, a zero setting at the bottom of the hole will ensure an accurate tool stop at the end of each pass. Again, easier diameter measurement of the bore.

Vernier and Height Gauges*

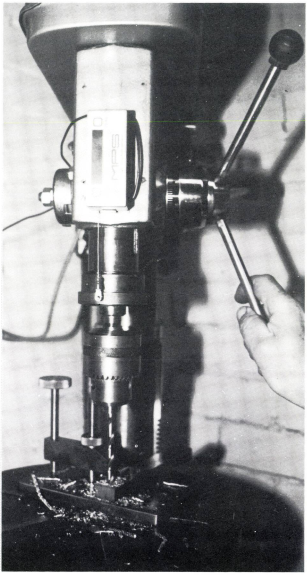
The convenience of digital readouts on large verniers and height gauges can now be obtained using the digital readout normally fixed to the lathe or mill. The easiest fixing method is to fix a backing plate to a readout clip, this can then be clamped using either a toolmaker's clamp or a specially shaped socket to fit the end of the gauge. Any good quality measuring equipment will be hardened, so it will not be possible to drill a small hole for a pin. The answer is to super glue a small flat head rivet or similar to the gauge.

Lathe Vertical Slide*

Some lathes allow for the top or compound slide to be re-attached to an angle plate to give a swiveling vertical slide. Unfortunately the calibration mark for the dial is now facing towards the chuck, with the consequent risk of touching a rotating chuck while leaning over and reading the position. The MPS can be easily read, even when turned through 90°, so keeping your head away from the chuck.

Home Built Machines*

Any home built machines, such as mills or cutter grinders, need calibrated axes movement to make them useful. It might be more cost effective, and certainly easier, to use an MPS than to engrave and stamp the calibration markings. And if you want zero settable dials then that is even more work. Another side benefit is that you no longer have to make the screw threads to any particular pitch because the MPS will measure independently of the screws. This is particularly true when geared drives are necessary, such as vertical quill movement on mills, when convenient size and ratio gears are not easily available or would have to be bought.



(21) This is just a test set up to check the advantage of using the MPS on a bench drill. Zero was set with the tip of the drill bit touching the surface of the job. A hole was drilled 10mm deep into a 19mm thick steel bar. This drilling machine has plenty of backlash and loose fittings, but it did drill a hole 10mm deep as checked with a depth vernier. Besides blind holes, it could be used for constant depth countersinks and counterbores without setting the depth stop.

Diameter readout*

It is possible to set up the MPS to read diameter instead of radius on the lathe cross slide. You will need to make a pulley with a minimum diameter of 18mm and a groove radius of 0.2mm mounted on a good quality ball bearing and fixed it to the side of the cross slide. The sensor wire is routed from the MPS, around the pulley and back to a fixed pin mounted on the saddle.

This will reduce the length of wire travel available, but it shouldn't be a problem for most lathes.

Power supply

The MPS can be run off batteries, but you'll only get about an hour out of a rechargeable battery.

The best way to provide power is via a small transformer commonly known as a battery eliminator.

I picked one of the Dick Smith range to do the job. When I went to plug it in the MPS plug wouldn't fit. I found that the MPS plug wouldn't fit anything!

Cut off the MPS plug and you could either hard-wire the MPS wire to the power supply wire or go to Dick Smith's and get a plug that matches your power pack. Solder the new plug onto the wire and you should be back in business.

There is no point in listing catalogue numbers because there are too many variations available. The best thing is to take the MPS to your favourite electronics store and ask them to match up a power pack and a suitable plug for the MPS cable.

The MPS unit is rated for 9 VDC, but I found that the variable voltage Battery Eliminator I had delivered nearly 9 volts at the 7.5V setting. Be careful not to overpower your unit.

Fix the power cable in such a position to prevent it being snagged or caught. Allow sufficient slack in the cable between the slides and the main casting so movement is not restricted. The power cable is not armoured so can be easily damaged.

Position the plug-in power supply well away from the machine, out of reach of all oil, coolant etc. The supplied power supply is double insulated so the readout does not require earthing.

Specifications*

- (0.005mm or 0.0002" resolution with 500mm 20" measuring range for EMPS).
- Allows for the positive direction of move-

ment of the axis to be set. You can set the direction how you want it, even opposite to the way the feed screw dials are calibrated.

- Can detect and provide warning if the maximum position tracking speed is exceeded.
- Simple display "okay" test.
- Display has leading zero suppression for easier reading.
- Weight of readout: 200g.
- Power requirements: An unregulated 9V dc supply at a maximum of 150mA from a 240Vac external double insulated 13A plug-in power supply.
- Maximum operating temperature: 35°C for both the power supply and the readout.
- Readout sealed to IP54 allowing use in areas subjected to coolant and swarf.
- Display: 5 digit plus sign red LED display, 0.3" 7.6mm high with antiglare filter (6 digits on EMPS).
- Display resolution of 0.01mm or 0.001" (0.005mm or 0.0002" on EMPS).
- Sensor built in using spring-loaded stranded stainless steel wire.
- The aluminium box (93mm long x 38mm wide x 32mm high) is jam-packed with electronic wizardry.

Accuracy

The first question most people ask is how accurate the MPS is. The User's manual describes it as:

"Accuracy is defined as the difference in the displayed position compared to the true position. The basic accuracy is +/-0.05mm plus a linear error of 0.05mm per 100mm plus a nonmonotonic interpolation error of +/-0.03mm (+/-0.002" plus 0.002" per 4" plus +/-0.0012"). There is an additional display rounding error in the range +/- 0.01 mm, 0.0004". When changing between inch and metric the position is re-calculated to allow for the different display resolution."

Resolution

"The readout display resolution is either 0.01mm or 0.001" (0.005mm or 0.0002" for EMPS). The minimum movement resolution displayed is dependent on whether inch or metric dimensions are displayed. The basic resolution of the MPS is about 0.01mm, 0.0004" (approximately 0.005mm or 0.0002" for EMPS)."

If your MPS is on a lathe cross slide you will need to be careful when taking cuts of 0.001" off the diameter. The standard MPS has a problem of reading 0.0005" that you'll need to take off the radius. I would guess that this situation would not arise often — as long as you are aware of it. The EMPS with its resolution of 0.0002" would be a better option if this kind of accuracy is the level you require. This is really splitting hairs though — I know I would have difficulty getting even close to that off the lathe's graduated dial! Normal cutting depths — as deep as your tool and machine can handle for roughing and about 0.020" for the finishing cut — are no problem for the MPS to provide you with all the accuracy you'll need.

The axis display can be zeroed at any time giving all the flexibility of zero settable dials on any machine.

Repeatability*

Position repeatability is defined as the ability to move away from a datum point and then return with the display indicating the start position. Repeatability is within the specified accuracy plus +/-0.025mm, 0.001" per 5° celsius temperature change.

Fitting the MPS

The photos show the use of a spring clip. This allows quick transfer of the MPS from one axis to another.

There are many other ways to fix the unit — the only limitation is your imagination. One suggestion I heard of was using a strong magnet to secure the unit. As long as the unit is rigid while in use it is not really critical how how you mount it.

"The measuring wire is terminated in a simple ring to allow it to be easily slipped over a pin. It is not necessary to screw the ring to the axis, particularly if the readout will be moved between machines. It is recommended that the pin has a small vee groove to allow repeatable positioning of the ring if the MPS is moved.

If the top wire entry MPS is being installed then it is essential that it is positioned such that liquids cannot run down the wire and hence into the readout.

When positioning the MPS, it is important that the measuring wire is pulled straight out from the readout. The maximum acceptable displacement is 5mm sideways for every 100mm of extension. If the wire is pulled at an angle then that will considerably shorten the fatigue life of the wire, the larger the angle the shorter the life. Because of the very small radius around which the wire is bent at the exit from the MPS then the reduction in life will be very considerable. If it is necessary to take the wire off at an angle then use a pulley with a minimum diameter of 18mm. This pulley must run on a ball bearing (to ensure optimum repeatability) and it is desirable that the groove has a 0.2mm radius at the bottom. Provided the wire and pulley are kept clean then this will have a negligible effect on the readout accuracy and repeatability."

Permanent fixing*

If desired the MPS can be permanently fixed. If this is to a machine tool then consideration should be given to also providing a permanent swarf and coolant guard. This will considerably reduce the need to clean the wire. The guard can consist of either ½" or ⅝" U section aluminium channel available from many large DIY stores. The wire would run in the channel with the open side facing down.

Multiple axes using a single MPS*

On very small machines it is possible to fit a single MPS to give a two axis readout. This is done by fixing the MPS to one axis and then taking the wire 90 degrees round a pulley and fixing the ring to the other axis. It is essential that this pulley uses a ball bearing and has a minimum diameter of 18mm with a groove radius of 0.2mm. When either axis is now moved the display will indicate the movement, to use this sensibly it is necessary to zero the display between changing the axis being moved. If you always move each axis to a datum point of zero then the position can be picked up for each axis.

Maintenance*

The MPS is maintenance free provided the wire is carefully cleaned of all swarf etc after use. Clean the wire using something similar to a kitchen towel or other lint free cloth. If machining materials that produce a very fine dust then this can be carried back into the MPS on the wire. This will normally result in the wire jamming and not returning, in this case the wire will need to be cleaned with a liquid such as petrol to wash the dust off, but keep the petrol away from the label. Following washing normal operation will be restored. Do not carry on using the MPS if it is obviously becoming stiff due to a build up of fine swarf. In the end the PTFE seal will be ruined, and if completely jammed, could even pull out.

Conclusion

The MPS is a versatile unit that can make your modelling life a little more productive and enjoyable. The MPS is rugged enough to stand up to normal workshop use.

Unfortunately I don't have a milling machine, so I can't show you the setup. That shouldn't be a problem because the system is so easy to use.

The unit is accurate and sufficiently user-friendly to help you produce work to tolerances (in metric or inches) you probably wouldn't have bothered with before!

The bright LED readout is a lot easier to see than the tiny graduated markings on most dials. The worry of backlash interfering with measurements is completely eliminated. And best of all, for me, is the time I save without having to stop for measurements or setting up datum points.

The other bonus is the ability to make two or more parts exactly the same easier than you did before — if you stick to the numbers!

If you decide to give it a try, call Sabanet P/L on (02) 9449 4415.

Or write to: Sabanet P/L 65 Woodbury Rd. St. Ives, NSW, 2075.

**Paragraphs of this text marked with an asterisk or in quotation marks have been borrowed, with permission, from the MPS User's Manual...ed.*

Managing Your Model Locomotive Boiler

by Lindsay Brack

Part 1

Safety First

For any newcomers to the operation of a model locomotive boiler it is recommended that they understand the Safety First aspects of operating the live steam locomotive.

Any club member can show them how to drive a steam locomotive, i.e. opening up the throttle and putting the engine into forward and reverse, etc. but managing a boiler is something else. Safety in operating a boiler is of prime importance because of the driver's close proximity, as he or she may suffer the most physical damage. Therefore, when operating a boiler, wearing gloves may be an advantage. Burns and blisters may occur to an ungloved hand caused by a hot fire door or by the various steam valves, etc., on the boiler.

Getting water to the boiler

The most important safety consideration in managing a steam boiler is knowing where the water resources are and how to get it into your boiler. If you have been asked to drive a steam locomotive, always remember not to try and operate that locomotive until the owner or someone responsible has pointed out to you the various operations of water feed that services that steam boiler.

A steam locomotive could have as many as four different water feeds for its boiler, i.e. a steam driven pump, one or two injectors, an axle pump, and a hand pump. An operator should be familiar with all of these methods of feeding water into a boiler.

By now you may have been told by someone of the serious damages that could occur, not only to the locomotive, but to an individual if the boiler runs low or out of water.

Knowing where the crown sheet in the boiler is, in relation to the water column, is very important. Some builders tend to have a water column that is too low in relation to the crown sheet. One may think that the water column is showing enough water in the boiler when in reality, the crown sheet is uncovered, and could be a source of danger. Therefore, the driver should check with the builder, or someone who knows the boiler, to find out just what the relationship of the water column is to the crown sheet.

If you find that the water is out of sight in the water column, you may experience a bit of panic — but remember to keep your head. The first thing you should do is get rid of the fire in the firebox. If the boiler is coal fired, drop the grate and let the ashes drop out onto the track. Do everything possible to reduce the heat in the firebox. If the boiler is not too low, try and feed water into the boiler carefully, trying not to warp the crown sheet or soften the flue tubes due to lack of water. If the flues become soft they may begin to warp and at the worst the silver solder will run, causing major damage to your boiler.

I have seen collapsed crown sheets, flue tubes and arch tubes in full-size locomotive boilers caused by low water level. It is a major repair job to make the boiler operational.

Fuel for your boiler

The third important point I would like to make on safety is in regard to fuels. Firing with coal or fuel oil, or even wood does not represent any big personal hazard. But there is one fuel that could be very hazardous, not only to the boiler but also to the operator. Propane, or LPG, has its place in the operation of our miniature locomotives and does have a lot of good features, but we won't go into it now because we are only talking about safety.

The problem arises — "Here, come over and run my locomotive!" It happens to be a propane locomotive, and you don't know anything about propane. I would, therefore, advise the owner of that locomotive to spend a good deal of time with you, showing you the proper operation of the valves for safely operating that boiler.

I don't mean to scare anyone, as propane can be a good fuel and can have its place in firing miniature locomotives. But knowing propane, knowing how it works, knowing what a particular engine requires in the way of valving, and knowing these valves is of a prime importance.

No matter what kind of fuel a locomotive is using, if you want to operate that locomotive, please be sure the owner or some qualified driver is riding behind you, just in case you happen to run into some problems.

The boiler

Each operator should know everything about a boiler, the component parts, the names of them, how they function, and the materials that they are made out of. A lot of us will never make a boiler. This usually gets left up to those who are very experienced in brazing and welding. But we must know what is on the inside of a boiler as this is very important to us, because if we understand a boiler, we will take better care of it, and we will then be able to operate it more efficiently.

The firebox

The firebox comprises of a tube plate, a crown sheet, a back plate, arch tubes, thermic syphons, and (depending on the fuel being used) and oil pan or grate. This is where combustion takes place and the heat required to change the water into steam is generated.

The firebox is used for controlling the intensity of the fire, for the amount of steam required to do the job. Under heavy loads a good hot fire is required to change the water into steam, because more steam is normally needed to pull the train. The intensity of the fire in the firebox is changed by controlling valves, which we will learn about later. It is interesting to note that 85% of the heat transfer to make this steam is done right here in the firebox.

The flues or tubes

The tube plate is the copper or steel sheet to which the flues are attached. The flues run forward into the smokebox, and are used primarily for the balance (15%) of heat transfer; they also remove the gases from the firebox to be dissipated to the smokebox, then to the chimney and, finally, to the atmosphere. Keeping the firebox and the flues clean is very important. If we allow the areas to get dirty because of the soot, the rate of heat transfer is reduced considerably. The result being that firing a boiler can be quite a chore, especially when hauling heavy loads. It is a must that periodic cleaning of the firebox and flues be done, depending on the type of fuel being used.

Coal is the main fuel that dirty's up those areas the most; for efficient firing of the boiler, the flues and firebox should be cleaned after every four to six hours of operation, depending on the type of fuel being used. Fuel oil also has a tendency of dirtying flues and fireboxes. However, attending to them so often is not all that necessary, but every 12-15 hours of running is a good range in which to think about cleaning these parts.

Cleaning flues is done with a bronze wire brush, or a hogs hair brush similar to the ones used in cleaning guns and rifles. *Never use steel wire brushes to clean copper tubes as these will score them and reduce their wall thickness.* The brushes scrape the loosely stuck soot from the flues. Sometimes we tend to forget to clean the firebox. This is a source of soot that can become adhered to the crown sheet. it is also important that the crown sheet is free of soot.

Propane burns extremely clean, and the chances of you having to clean fireboxes or flues in engines that use propane as a fuel is very slight.

The smokebox

The smokebox houses the exhaust stack and the blower, and is another area that accumulates soot.

The blower is a very important part of the boiler. We help control the intensity of the fire in the firebox by the use of the blower. No general rule can be used for its operation, but in essence, the blower reduces the atmospheric pressure in the smokebox, thus permitting a flow of air or gases from the firebox through the flues, then up the stack. This flow of air helps combustion in the firebox, because more oxygen is being brought into the firebox. You can see then that controlling the blower from the cab helps maintain higher or lower fire intensity in the firebox.

To be continued...

90 Not Out!

Story and photos by Brian Carter

How long have model engineering clubs been in Australia? In this issue is a short story of the 50th anniversary of the South Australian Society of Model Engineers. There is also a mention of the Hales Creek Railroad of the late 1930s. Recent correspondence about the Surrey Hills Live Steamers in Victoria, formed in 1941, adds more historical relevence to the question.

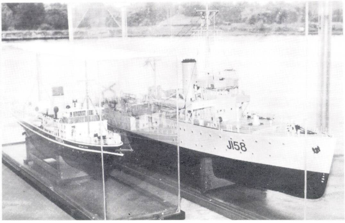
The weekend of 26 and 27 October 1996 marked another milestone in the history of model engineering in Australia: the 90th anniversary of the Sydney Society of Model Engineers.

A Letter Box contribution from Lloyd Grono to AME in March 1989 provided a potted history of SSME written about 1971.

"The Sydney Society of Model Engineers has quite a remarkable history, being originally formed on the 1st of August, 1900 at 251 Elizabeth Street, Hyde Park, Sydney, under R. McN. Ferguson as President, R.V. Hodgson as Secretary and J. Moore as Treasurer with 34 members. The population of Sydney at that time was 400,000 souls. The event was published in the *Model Engineer and Amateur Electrician* October 15th, 1900 edition in London.

"The years between 1900 and 1906 yield very little information on activities of the club, owing to the destruction of the *Model Engineer*'s' offices, together with records, by the Luftwaffe during raids on London during the Second World War. However, in 1906 the society was re-established as the "Summer Hill Society of Model Engineers" with J.L. Purnell as President and R. Laxton as Secretary. In 1908 the Society's name was changed to "The Sydney Society of Model and Experimental Engineers".

The newly refurbished pond eagerly awaiting maritimers.



Two fine models by George King. A harbour pilot ***Captain Cook*** *(left) and a Bathurst class Corvette.*

Two cars racing on the radio control car track.

"On the 1st June, 1935 the first official meeting of the society in its own clubrooms at 190 Parramatta Road, Ashfield, was held. The Club House and grounds were officially opened by His Excellency Brigadier General Sir Alexander Hore-Ruthven on Saturday, the 14th September, 1935.

"In 1961, the society changed its name to "The Sydney Society of Model Engineers Ltd", and a Certificate of Incorporation of Company was issued on the 1st of March, 1961. On the 3rd of August, 1970, the society negotiated the purchase of its present headquarters situated at R.53, Lot 16, Luddenham Road, St Marys, the site covering 25 acres in all.

"The first Annual General Meeting was held in the new clubhouse at the above address on Saturday the 27th of March, 1971. Needless to say it was a proud day for all members of the society.

"The property at Luddenham, due to the hard work and self sacrifice of the Society's members, is fast developing into the finest Model Engineering complex in the world and without any shadow of doubt equalled in the range of facilities offered, also having the unique record of being the oldest continuously functioning Society of Model Engineers in the world.

"Facilities offered at the Society's grounds at Luddenham include a magnificent high speed car track for racing cars up to 10c.c. capacity. A new clubhouse 80' x 40' is under completion with catering facilities and housing the slot car track: probably the best in New South Wales. A new HO gauge layout is under construction together with club offices and library etc. The boating lake is functional for radio controlled boats, power boats and yachts, with little work remaining to complete this project. A flying field exists for radio controlled and free flight aircraft models with facilities for slope soaring gliders. Work has started on the construction of a track for 2½", 3½" and 5" gauge locomotives, the track being some 550ft in length and elevated. As soon as this project is completed, work will commence on a one mile track for 5", 7¼", 8", 10" and 12" gauge railway locomotives."

SSME members will realize that much of the latter part of the above story has already come to pass. Perhaps a society member will one day continue the history from 1971.

Special members

Sunday 27 October 1996 was a very special day for three members of the Society. Life membership was awarded to George and Glad King and Arthur Mears. Congratulations on a deserving award!

To the future

Unfortunately their 90th birthday caught SSME on the hop somewhat, and the inter-club run on 26 October was not well attended, probably through lack of much advance publicity. Rumours are that members are saving up for their 100th to give it all they've got!

Using images of *Thomas and Friends* — where do we stand?

by Clive Huggan

"There's Thomas!!!"

That's the cry that any model engineer with a blue locomotive hears most — often shouted at a distance, with mum and dad being dragged towards the track!

Even with a black locomotive, I find myself being quizzed by ankle-biters who want to relate it to their favourite.

"Who's that?", I'm asked.

Inwardly I panic, in front of dozens of parents and kids, all of whom can probably recite the entire script and genealogical tables for *Thomas the Tank Engine and Friends*. I know that some of them can read "Sir Lancelot Stirling" on the cab-side of my SAR 500 Class. I'll be sunk if I say anything else, so I fumble, "Er, this is Lancelot."

Straight back comes the next question: "Is Lancelot a friend of Thomas?"

I panic again: Crikey! I'm going to be dragged in!

Feigning a relaxed attitude, I reply "Oh yes, Thomas and Lancelot are good mates!" And I quickly find something to adjust on the loco, hoping to escape by becoming "otherwise engaged".

If being grilled in front of an audience that will burst into tears if you say the wrong thing isn't bad enough, some of our colleagues actually court disaster and put Thomas faces on the front of their locos!

It was after such an event that I found myself wondering where we stand on using *Thomas the Tank Engine* images and names. I couldn't find anyone who had asked permission before doing so. Like many model engineers, I had thought a few times about putting a *Thomas* face on my loco for special occasions — but I hesitated because I didn't know whether permission is needed in non-profit situations. I was cautious, because I knew the copyright holder had taken court action against an English locomotive preservation society. It made sense to find out.

The rights of copyright

Most people don't have any difficulty accepting the idea behind copyright. However, I know some who think a firm should not profit from something "warm and cuddly" like *Thomas*. That idea doesn't really hold water. The copyright owners paid for the copyright in the first place, they invested large amounts of money in their ventures, and they have as much right to protect their investment as any other company. For a business based solely on an idea, protecting a copyright is vital.

Significantly for members of our hobby, if the copyright owners hadn't managed their idea so well, children wouldn't see *Thomas* stories on TV, and wouldn't know what steam engines are. Most of us don't want that to happen.

The *Copyright Act 1968* and international copyright conventions give legal protection to owners of images and text. Therefore, if copyright owners agree that other people can use their material, we are bound to comply with any stipulations they make — whatever they might be. Otherwise we cannot use them.

I decided to find out what the licensing requirements were for *Thomas and Friends*.

After several phone calls overseas I found the Britt Allcroft Company — the holder of international copyright. They referred me to their Australian representatives, Gaffney International Licensing Pty Ltd, based in Melbourne.

Gaffney International sent me a pleasant letter answering the questions I posed. I wrote a first draft of this article, and sent it with several more questions for comment. These were to clarify the non-commercial situations that would apply to most model engineers, because the companies' policies seemed mainly directed at commercial enterprises and special occasions. These events — called "Friends of *Thomas*" events — are often backed by extensive advertising.

Stop the presses

A subsequent draft, sent to the UK to ensure the answers were authoritative, revealed some inconsistencies and loopholes. After further discussion with staff of Gaffney International to resolve them, a final, confirmatory draft was sent and this article was scheduled for a January printing. In early December, the cover was printed (colour print runs are done well ahead). On the same day, we received a call telling us not to go ahead with the article. No reason was given by the staff member who called, nor could we find the source of the decision.

Subsequently, all calls to the two most senior entities of the company, to ascertain the origin of the decision, the reasons and possible solutions, have been unsuccessful and have not been returned.

We had to make a quick decision. If the cover had not been printed, we could have pulled the article and waited again. In the circumstances, we decided to print the article but to omit quoting or interpreting information received from Gaffney International Licensing Pty Ltd. This is a major deletion, but we felt we could still help our readers by mentioning aspects that come within the companies' interest.

AME apologises for any inconvenience caused by our present inability to provide more details. We hope to print these central elements of the article if the decision is amended or if there is minimal legal risk in publishing the remainder of what we have written..

Using "Thomas" imagery

AME recommends that, before you commit yourself to constructing or adapting a loco, you contact Gaffney International to ascertain their policy — especially about any of the following aspects:

- if you want to display on your loco an image that represents the face of *Thomas* or any other character from the TV series;
- if you want to put a face on a loco and a sign that reads "Thomas" on the side, but does not otherwise represent *Thomas*;
- if you want to build a locomotive as a Thomas replica; and
- if you want to mention *Thomas* in any way in advertising on site, in print or in the electronic media.

Please note that you should contact Gaffney International irrespective of whether the locomotive is on static display or operating on private tracks, on club tracks or commercial operators' tracks, for profit or not.

All the characters for which the Britt Allcroft Company owns copyright come under their policies, not just *Thomas*.

Over all, the moral is: if in doubt, ask first. There are penalties for copyright infringement.

The addresses to contact are:

Gaffney International Licensing Pty Ltd
290 Coventry Street
SOUTH MELBOURNE VIC 3205
Telephone (03) 9699 8899;
fax (03) 9699 8800.

Our New Zealand readers should contact:

Newman International Licensing
20 Gillies Avenue
Newmarket
AUCKLAND
Telephone: 09-520 5010;
fax 09-520 5070.

The Hales Creek Railroad

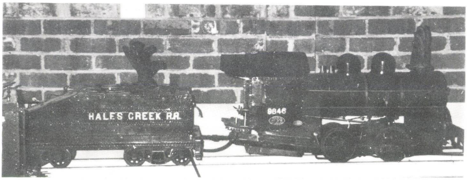
Story and photos by Peter Medlin

I noted with interest the entry concerning the Hales Creek Railroad in the News Desk Section (page 54) of the July-August 1996 issue of AME.

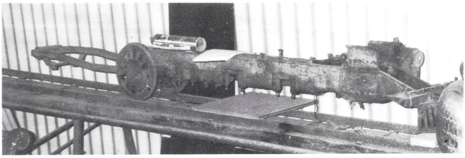
Chris Holmes and I have been researching miniature and amusement park railways for a number of years and we have the following which may be of interest to your readers.

Readers will be pleased to know that the locomotives still exist at a private railway near Korumburra and near Moe in Victoria.

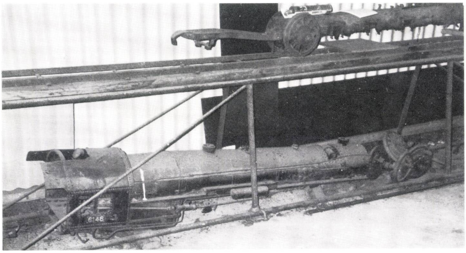
An article on the railway appears in the magazine Railways In Australia of January, 1951 p.13. The photographs are of two of the locomotives (Nos. 9846 and 6146) taken recently.



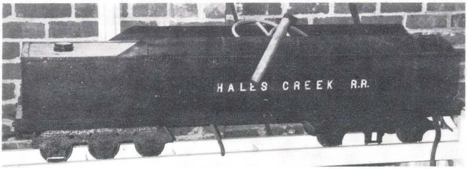
The 0-4-0 Switcher No. 9846.



The frame of 4-8-2 No. 6146.



Boiler and cab from No. 6146, 4-8-2 waiting to be rebuilt.



The tender from No. 6146, 4-8-2

The Hales Creek Railroad was located on (or near) land now occupied by the Royal Victorian Institute for the Blind on the Burwood Highway, Burwood (A reader, Bob Carlton thinks it may have been on Eley Rd. Burwood East. Bob saw the trains at a Melbourne Exhibition). The property was owned by Mr. Walter Hales and was located behind the "Tailwaggers Kennel". A Mr. Hughes was also involved in the H.C.R.R. — he was an Auto-Electrician at Deepdene.

At least three locos were in use. Loco numbers refer to date built i.e. 9846 refers to 9th August, 1946.

- 0-4-0 Switcher No. 9846.
- 4-8-2 No. 6146
- 4-6-2 No. 14837 (*Railways In Australia* shows this loco No. as 1483, however this does not fit in with the date built, so it may be a misprint in the article).

The 0-4-0 Switcher is believed to have been built in six weeks! Just in time for a display at an exhibition in Melbourne. It is believed that it was rebuilt in the early 1960s by Ron Kain (later of the Walhalla and Thomson River Steam Tramway). Its new owner had it reboilered in recent years and is still operational.

The 4-8-2 also known as the *Mohawk* has been dismantled and requires a major overhaul before it can run again.

The 4-6-2, although not seen, has been resold and it is believed to be undergoing an overhaul.

Acknowledgment to Adrian Kells and Steve Martin for assistance with some of the information.

Chris Holmes and I have other information on the miniature and amusement park railways around Victoria and some on interstate, which could be published through AME as a regular feature if readers were interested. We would also be interested to hear from people with information on these types of lines.

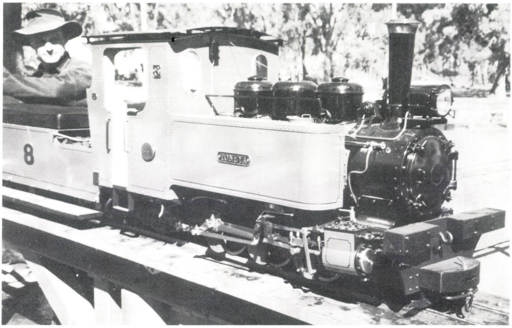
AME would be delighted to publish more of this material — what do you think? Let us know... bmc

TONEYA

A 2½" scale Fowler Locomotive

by Ross Bishop-Wear — Part Two

Photos by Ross Bishop-Wear. Drawings for publication by Neil Graham



Toneya *sits on the turntable at a club track. The author is waiting for the "stick" (aka. the green) before* Toneya *is whistled out to commence the days duty hauling passengers.*

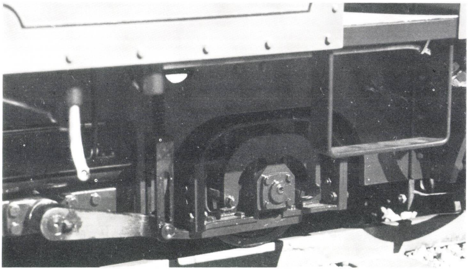
Having completed the boiler and some of the accessories we desperately needed something to hang it all on. The logic of starting with the frames and working up was now blatantly evident, for shifting the boiler around and storing finished parts not yet needed was becoming awkward.

Frames

The frames are 8mm black mild steel profile cut and surface ground, finally being machined all round to size. These days, laser cutting firms are more commonly capable of handling 8mm plate so this may well be a better option than flame cutting. Being heavier than scale, certain allowances need to made to accommodate the extra thickness. They are bolted and riveted together as per the original with some internal stretchers welded in. The main structural difference came about when I wanted to simplify the smokebox saddle from a complex casting with steam and exhaust pipes cored in, to an open fabrication allowing plenty of room for your hands to connect the plumbing to the cylinders.

Saddle

On a steam locomotive the smokebox saddle might be thought of as the anchor point for the boiler, the back end just being mounted on slides for expansion. This is quite true of course but the smokebox saddle also forms a major component of the frame structure. Crucial to maintaining alignment for the crossheads and pistons is ensuring the frame is rigidly supported in the region of the cylinders. In the Fowler, the smokebox saddle casting protruded deep down into the frames, being virtually a complete box section giving great support to the cylinders on the outside of the frame.



The rear bogie frames were authentically fabricated from mild steel. The handbrake rod and damper door with its vertical operating rod are also visible.

To allow access and reduce the amount of metal to heat up I chose to fabricate a saddle in 3mm plate, the function of which was limited to securing the boiler. A large horizontal plate was fitted between the frames to provide the necessary support for the cylinders and stiffen the front buffer beam as a bonus. Steam and exhaust pipes are just copper lagged with the modern equivalent of asbestos string.

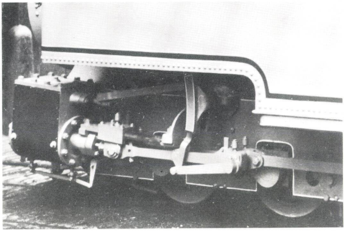
Suspension

In looking to build in as much extra weight as possible I decided not to bother with scale spoked wheels and axles; instead leaving them solid with large diameter axles as none of it can be seen anyway. Just the form of the tyre is machined into the face of the wheel which, in my opinion, is quite satisfactory. Likewise, the compensated leaf spring suspension is also well hidden so I cheated here using rubber blocks instead.

The difficulty with suspension when you're building a model for the first time is that you don't know how heavy its going to be so you can't really make the springs until the end when in actual fact you really need to have them at the start. I had used rubber quite successfully on my father's *Perry* so I felt confident enough to use it again. Probably the worse side of it is that it's quite rigid which is probably not ideal for good traction on rough trackwork but on the other hand, it does give a very smooth and stable feel to the engine. How satisfactory leaf springing would be supporting an engine of such overscale weight I wasn't game enough to try out. Leave it to someone else!

Trailing truck

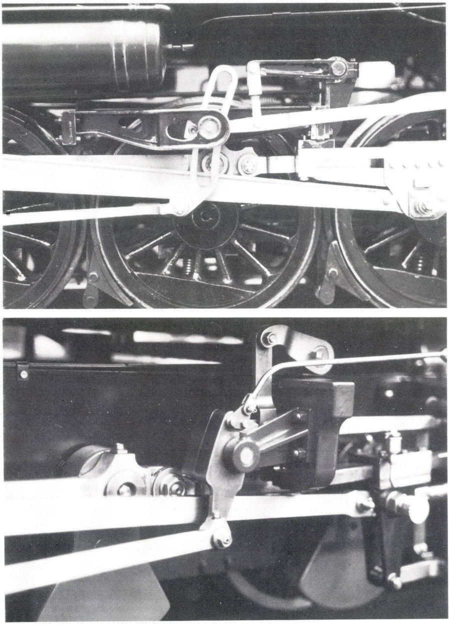
The back bogie was a project on its own. It is a swing link type with some interesting and tricky fabrication to do to keep the right appearance on the side frames. Access is through the cab floor to lubricate and inspect the swing arm linkage and bolster. The original having a standard Timken® axle box meant that insufficient space existed to fit ball or needle roller bearings so I had to settle for Sintalite bushes instead. Incidentally, the main axleboxes are bushes also with the oil being applied with a pressure oil can up through the centre of the axle. With a "trillion" miles of running on this system I saw no real need to change although many other proven arrangements exist.



Right *shows the Joy valve gear on a typical Fowler locomotive.*
Photo: Rural History Centre, University of Reading, U.K. Ref. No. 35/13134

Mystery valve gear?

Several people have inquired as to the type of valve gear on the engine. It is Walschaert's with a couple of unique features necessary by design. My belief is that the cylinder casting was firstly designed for use with Joy valve gear which was commonly applied to Fowler engines. Joy derives its motion from the connecting rod with a curved link directly above. It is therefore desirable to place the valve spindle directly above the piston centre line ie. contrary to common practice, the valve spindle is not offset to the bore. The valve would be driven directly from the link with no lateral forces present. The double combination lever setup straddling the crosshead is mechanically very desirable and the bearing areas thus provided are good and generous.



Top *photo shows the expansion link arrangement on a 5" NSWGR 59 class, with its offset valve chest making the valve gear construction and alignment far more practical and easier to effect.*
Bottom *photo shows the expansion link arrangement on the author's Fowler, which has a vertically in line valve chest resulting in the expansion link tail being offset to the radius rod.*

However, it seems likely at some point that an option of having your engine supplied with Walschaert's became a prudent selling point so some poor sod had to sit down and make it fit in an unfavorable space. The problems encountered are documented in the drawings by discrete chamfers and odd cut outs to achieve the necessary clearances. My theory is that in the desire to retain standard components at the combination lever end (a superior arrangement in any case) the designer was faced with using the very short link so that the connecting rod had adequate clearance to oscillate below. An engine having the valve spindle offset from the bore can have the link suspended outside the connecting rod providing clearance for it to pass up the inside. In which case the link is not restricted in length.

In spite of quite short valve travel, errors of radial valve gears are not helped by this arrangement. Additionally, due to the convenience of placing the weighshaft ahead of the link facing backward, the engine runs forward in the top of the link which is opposite to normal. When a radius rod is suspended by an arm in this manner it travels in an arc as it moves back and forth. Conventional Walshaert's has preference for running forward in the bottom of the link because the arc of the radius rod roughly coincides with the swing of the link reducing die slip to a minimum in the most common running position; forward. Cane loco's are not restricted to forward running and are not required to maximize efficiency to the degree expected of express engines. Running forward in the top of the link is not ideal, your brightest cane toad would be glad to notice. However, for a person trying to make the best damn valve gear in the world, it was somewhat anti-climactic

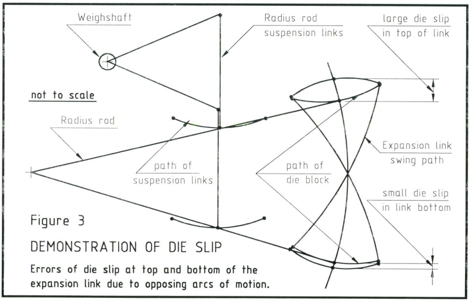


Figure 3

DEMONSTRATION OF DIE SLIP

Errors of die slip at top and bottom of the expansion link due to opposing arcs of motion.

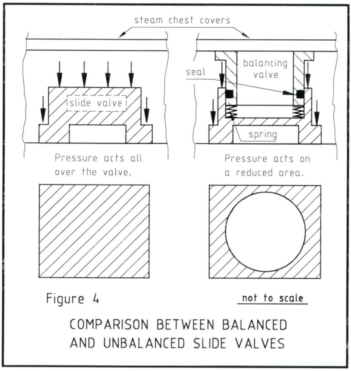


Figure 4

COMPARISON BETWEEN BALANCED AND UNBALANCED SLIDE VALVES

to be beaten by inherent errors beyond my control!

Once again, rather than scale the valve gear from full size, I used D.L Ashston's book *Walshaert's Valve Gear for Model Engineers* and specifically designed it to function in model form. Following Ashton's recommendations I selected a full gear cutoff of around 70% (up to 82% is possible) which meant the engine would be slightly notched up even in full gear. In practice, with a lead opening of 5 thou (0.13mm) the engine starts well in all positions and delivers four even beats in full gear both forward and reverse. Performance is slightly better in reverse due to the errors of the link arrangements. Notching up is not all that great, again because of the short link, a single notch on the reverse lever results in rather coarse adjustment of valve travel. One notch would reduce the cut-off from full gear 70% to about 40% in one jump. *Toneya* runs quite well at that but the exhaust beats are pretty wishy-washy and the steam chest pressure is getting up around 40 or 50 pound when you're pulling a load.

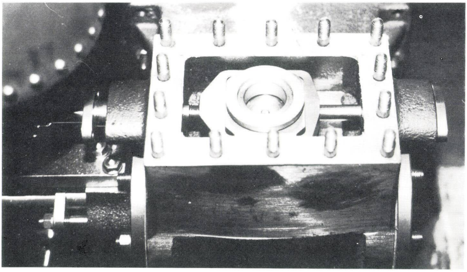
Balanced valves

True to the prototype I used balanced slide valves which is the first time I've had the opportunity to study them. Enquiries to other model engineers revealed nought but a feeling that they should be beneficial in reducing the load on the valve gear. True or not I had to have 'em and once again grave doubts as to their effectiveness both in full size and model form became apparent.

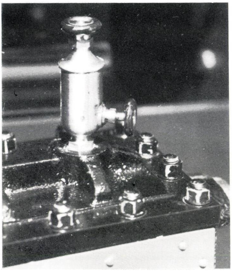
The principle is this: a conventional slide valve carries a lot of weight due to steam pressure bearing down on top of it. If a piston is inserted in the top of the valve sealing against the steam chest cover above, the effective area exposed to pressure is reduced by the area of this piston. Hence, less actual load is applied to the valve and less effort is required on the part of the valve gear to move it. Sounds better than sliced bread doesn't it? This is what I found out.

Working roughly to scale proportions from the full size drawings I discovered that the piston being round only balanced a portion of the square area of the valve — about 50%. Of that 50% some force must be applied to the balancing piston to hold it up and have it seal against the steam chest cover. This incurrs additional friction that you are trying to save. Some of the friction saved from the valve can now be attributed to the balancing piston. Reduce effectiveness to 25%. If the balancing piston leaked steam into its centre then the force would start to build up on the back of the valve again. To ensure this did not happen I drilled a passage venting the centre chamber to exhaust; a feature that was not included on the original and now I know why. Under load a substantial amount of live steam leaked past the balancing piston and blew up the chimney in a horrible wheeze. I quickly blocked up the vent hole as per prototype and now you can't tell if it's leaking or not!

Knowing that it is leaking — reduce effectiveness to 10% under load. Under load the steam chest pressure reads between 20 and 40 pound — 10% of which is a miserable 2 to 4 pounds multiplied by the area exposed on the valve and the coefficient of friction of a well oiled surface and it all comes to bugger all! Essentially, benefits gained by reducing friction from the valve by balancing are lost again getting the balancing piston to seal under pressure! Still, you can almost hear a Fowler salesman bending your ear about how great it was and how much longer your engine would last!



Looking into the steam chest showing the slide valve and the circular balancing valve on top.



The displacement lubricators on top of the steam chests are used for dosing the cylinders with oil after a run.

Material selection

While on the subject of valve gear, I'll just make mention of some of the materials used. As I said before, *Toneya* was to be made of the finest and with this in mind I made the slide bars, expansion links and crank pins of high tensile steel (ANSI 4140) which can finished to shape, ground and gas nitrided to give an extremely hard wearing surface. The beauty of nitriding as a heat treatment process is that it is carried out at a low temperature (530° C). This is less than red hot. The process involves soaking at this temperature for several hours in an atmosphere of Ammonia gas. Forget about doing it in Mum's oven — see a commercial heat treater! Distortion is virtually nil due to the low temperature and absence of quenching. The finished product has a dry grey surface with splashes of blue from the heat. There is no oxide or salt bath residue or anything else. Just oil it up and use it! If you have forgotten to drill or tap a hole the thin hard surface is easily penetrated with a drill and the base metal is just as it was beforehand. The other great benefit of using this process is that the temperature is nearly 100 degrees below the melting point of silver solder which means you can actually harden a silver soldered fabrication such as the expansion links. The down side for the average model engineering workshop is chewing out a shape like a link from a piece of round bar as this is the common form of this alloy. However, in extreme circumstances, it may pay to contact a tool steel supplier for a slab of suitable alloy but, I warn you, it might be heavy going on a light machine.

I like to use cast iron die blocks in a hard link, and the same for the crosshead on the hardened slide bar. This crosshead has a bronze slipper on the bottom and upper and lower oil galleries fed by the brass oil pots provided. The little end pin joint in the crosshead is fitted with a spherical plain bearing (commercially available) which accommodates misalignment due to movement in the suspension. The same type of bearing is used in the coupling rod knuckle. Both are grease lubricated. The rest of the motion is conventional bronze bushes and silver steel pins. Where possible reservoirs are provided for lubrication so that a full oil up is only needed once or twice a day at the most.

Lubricators

The little displacement lubricators applied to the top of the steam chests are not strictly suited to this engine. However, they were used on earlier Fowlers and look very cute. Wanting to give the appearance of timber handles simply, I tried 'O' rings as hand grips which are quite effective in my view. The function of these lubricators in model form is only to enable oil to be administered to the cylinders after a run. The running lubrication comes from the twin ram mechanical lubricator (remember the one hanging from the ceiling?) installed out of sight in the right side tank.

Having dealt with all these various matters by now, the engine was very nearly completed. It was painted progressively as assemblies become ready which eased the burden greatly at the end. Painting an engine well is a big job for impatient people like me. All the painted parts were etch primed, in as larger completed chunks as practical so that the nuts and bolts were done at the same time. Two or three finishing coats of enamel with hardener additive were applied depending on coverage and the degree of luck on the day. Partially due to tedious preparation and a lot due to luck, the finish coats of green came out beyond expectations which was very pleasing. On final assembly, I was confronted by a couple of hundred nuts and bolts to touch up which must be done very carefully to avoid unsightly fillets of paint around the heads. Doing ten or twenty each day before going home helped ensure it didn't get me down.

Builder's plates

One of the nicest finishing touches was organized by my good friend Ray Bannerman. Through a friend of Ray's we were able to enlarge a photograph of the Fowler builder's plate, digitize the image so that it could be displayed on a computer screen, firmed up and a Bromide produced at the correct scale. The Bromide was used by a photo etching firm to produce the plates in 2mm engraving brass very economically. The plate we chose is not strictly correct for an engine of this era. It actually belongs to Fowlers of the 1880's and was cast in iron and painted. Later engines all had individual serial numbers which poses a problem if you want to produce a small quantity because you need different artwork for each one. Secondly, the fact that my engine was not an exact replica of any one Fowler in particular, we felt a generic plate that could be fitted to other Fowlers as well would be more appropriate to use. Mounted on a blob of Jarrah timber it really steals the show. Incidentally, the name and number plates were hand made by cutting the letters out of brass sheet and soldering them to a machined back plate. Tedious but satisfying work!

Eating the saturated crow

In the last twelve months since the locomotive was completed, my general dis-satisfaction with the previously discussed saturated steam problem on this locomotive led me to consider radical surgery, even to the extent of building a copper boiler fitted with concentric radiant superheaters. However, before I committed myself to such a drastic operation, I took the advise of Dallas King of the Lake Macquarie (Newcastle NSW) club to try something a little less involved which may solve the condensation problem.

Enter superheat

A length of ½" outside diameter stainless steel tube was bent in the middle like a closed safety pin and slid through two outer firetubes from the firebox end so that when fully in position, a coil exists under the firebox crown sheet and each "leg" of this ½" outside diameter safety pin extends through into the smokebox. The principle of the arrangement is shown in Figure 5. Note that a retro fit of this type is only possible with a Briggs type boiler due to the absence of a wet backhead.

I did perceive some disadvantages with this type of addition as follows:

- Once fitted, it is not easily removed.
- Two firetubes are sacrificed, completely blocked by the ½" tube.
- The available heating surface area is less than a conventional superheater.
- In the absence of flue gas surrounding the superheater tubes for their length through the boiler tubes, the superheated steam may be cooled by the lower surrounding

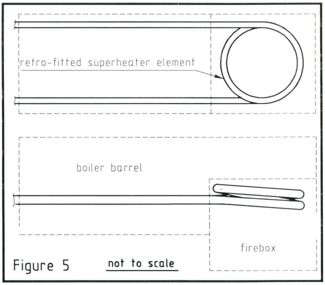


Figure 5 not to scale

ambient temperature of the boiler.

However, the result of this retro-fit has been very satisfying. The steam is obviously very much drier, as the previously described condensation problems have virtually disappeared! The exhaust beat of the engine is now much snappier, and, as you would expect, there has been a marginal improvement in the coal and water consumption (although not as much as some would lead us to believe). Evidence suggests under medium load conditions the superheater increases the steam temperature by about 20-30 degrees celsius above saturated. This does not sound very much to me, presumably it is low due to the small heating surface area and the suspected cooling effect in the flue tubes. I suspect quite a bit is soaked up converting liquid to vapour in the drying process without actually increasing the temperature. Nevertheless, this is all stored energy that can now be converted to mechanical work by expansion in the cylinders. The results have spoken for themselves. It would be interesting to know however, the comparative performance of more conventional types of superheating in similar engines.

The most rewarding bonus has been a very marked increase in low speed torque. That is, starting and hauling heavy loads at low speed without stalling. On occasions with perfect track conditions, we have had the opportunity to fully load the engine (with about two tonnes) on long unrelenting grades. At full throttle and with no wheel slip (which I attribute to good valve events) the engine lugged along at a crawl, noticeably tugging on the drawbar with each new stroke and exhaust beats that sounded amazing in the stillness of the quiet winter morning. I don't know what the neighbours thought, as on one occasion the trials took place at 5am!

Briggs boilers (addendum)

In the November-December 1996 issue, page 26, column 3, the "certified welder" refers to a Welding Supervisor in possession of AS1796 certificate No.10.

Thoughts on excellence

Being a critical person by nature, I rarely see things through rose coloured spectacles. The better something seems the harder I look at it. Sometimes I think I'm my own worst enemy; impossible to please. Certainly, *Toneya* is the best thing I've ever made. But, there's always something that you'd like to do better or differently and things you'd like to put on that you didn't. I suppose if I had no other things in life but my engine then the gap between good and perfect could be closed that little bit more. I'm sure I would go mad trying! Trouble is, these days, there are so many excellent models being made, you just about have to go mad with it all to make any impression!

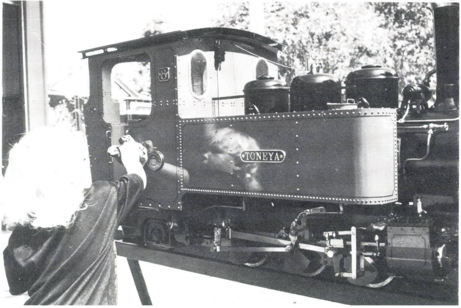
Toneya's vital statistics

Length	1130mm (51")
Height	685mm (27")
Width	440mm (17.25")
Cylinder Bore	50.8mm (2")
Cylinder Stroke	74mm (nearly 3")
Driving Wheel Diameter	150mm (6")
Weight in Working Order	210kg (460 lbs)
Boiler Diameter	190mm (7.5")
Working Pressure	700kPa (100psi)

Acknowledgment

Fowler locomotive print No.13134 supplied by:
Rural History Centre, University of Reading, Whiteknights, PO Box 229, Reading, Berks, RG6 2AG, England UK.

In April 1996, Ross received official recognition for his outstanding effort, when his locomotive Toneya *was judged and awarded the Bolton Trophy for the "Best Australian Prototype" at the AALS Convention at Penfield in South Australia... ed.*



Son Nicholas finishes wiping down the loco after a days run.

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AUSTRALIA.

50 years at SASMEE Park

by Bryce Ames

Photos by Brian Carter (taken during the 1996 AALS convention period)

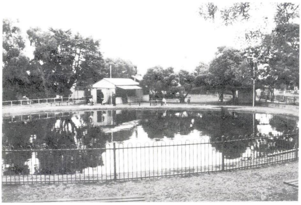
In 1946 the South Australian Society of Model and Experimental Engineers (SASMEE) negotiated with the South Australian Government to lease a parcel of land at the junction between the Adelaide Hills and southern suburbs railway line. This land was then used to build a miniature railway plus other facilities associated with model engineering.

Over the ensuing years the society has been able to extend, modify, and improve SASMEE Park to the excellent, picturesque place that draws considerable crowds on public field (running) days held twice a month.

SASMEE Park now caters for 3½", 5" and 7¼" ground level tracks, in two separate layouts: one of 3½" and 5" gauges and the other in 5" and 7¼" gauges. We have two stations, one situated on each of the track layouts. One of the these is named after a station that was recently closed on the full-size main hills line: Millswood, the name of the suburb in which SASMEE Park is located.

In addition, there is a 30 metre diameter pond, a steam house with a range of miniature stationary steam engines, three full-size operational steam engines and a track for steam driven vehicles

The unique location of SASMEE Park.



The 30 metre boat pond.

As this was our fiftieth year of residence, we decided early this year to hold an exhibition over two days of a weekend in November, the 2nd and 3rd. A subcommittee of five members volunteered to plan the proceedings of this very auspicious function. Marquees were ordered to house the numerous exhibits supplied by the 100-plus members as well as an excellent range of steam-powered models on the tracks and the boat pond — where a large range of alternative powered boats sailed.

The opening day saw a very good crowd and an official opening by our Patron, who as the Minister of Transport is also our land lord, and our two Vice Patrons: one another Member of the State Government and the other the local Mayor of Unley. The official party were treated to train rides, a guided tour of the exhibition and afternoon tea. During the official opening ceremony a certificate for 60 years' membership was presented to Ralph Skewes, who has been actively involved throughout this period. We discussed the prospect with the Minister to gaining permanent residency at SASMEE Park, rather than our current annual lease.

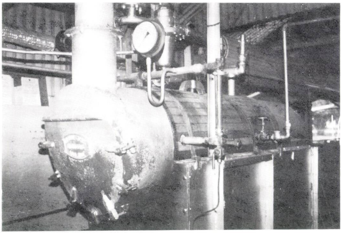
On Saturday evening, members from other kindred clubs and SASMEE enjoyed a great barbeque party to celebrate the fiftieth year at SASME Park. I welcomed all those in attendance and thanked all members for their involvement. A birthday cake had been donated by one of the members and was celebrated in the usual jovial form.

As a means of remembering this occasion, the society had a special bronze medallion struck one of which was given to each of our special guests.

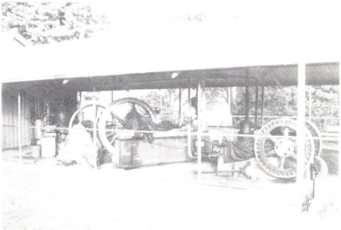
On the second day we experienced double the usual crowd and a very pleasant sunny afternoon The numerous trains carried the public all afternoon and allowed all who came through the gates to have many rides on each of the mobile models.

As president I was particularly proud of the standard, the range of exhibits displayed — both static and moving — the enthusiasm, commitment and involvement of the members of the society to make this exhibition a resounding success; and more particularly as a celebration for our fiftieth year of residency.

But there won't be long before the next party: next year we will be celebrating SASME's 70th Birthday!



Not many clubs can claim ownership of an operational full-size boiler house!



The engine room — SASMEE's collection of full-size and model stationary steam engines.

The Road to Cobden 1997

Photos by Ian McArthur

It's full steam ahead at the Miniature Railway Park, Cobden, Victoria, host venue for the 41st AALS National Convention over Easter 1997. Track works have been proceeding at a furious pace to provide facilities capable of handling the many expected visitors and their engines in 1997. The park now has two kilometres of dual 5" and 7¼ " track and 330 metres of raised dual 3½ " and 5" track.

Four additional parking bays have been added (with interstate welding assistance!) plus two loops and additions to the steaming bay area. A signal box and fully operational semaphore signalling system is in operation. A new footbridge is in place just to the East of the new brick station, picket fencing has been erected, the level crossing concreted and the former Cobden Railway Station, restored to its former glory, overlooks the man made dam (suitable for radio controlled boats). Gardens in the Railway Park are being transformed by the green fingers of the Cobden Garden Club to have all in readiness for 1997.

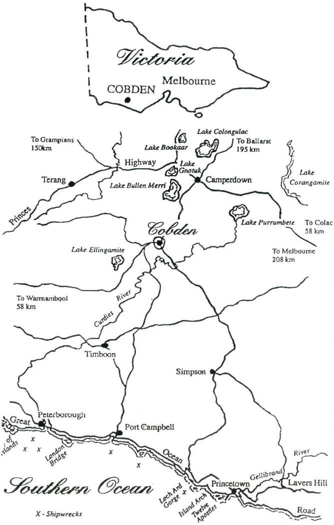
On-site facilities will be 'upgraded' at Easter with a temporary tent city to cater for the visitors who will enjoy good old fashioned country hospitality at Cobden, dairying capital of the world, in Victoria's South West.

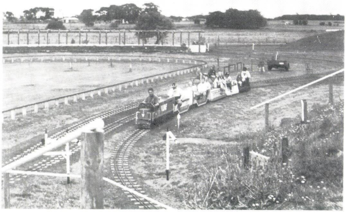
South Western Model Engineers, Cobden, Victoria

Further information from Alan Hart, Organising Secretary,
PO Box 42, Cobden, 3266

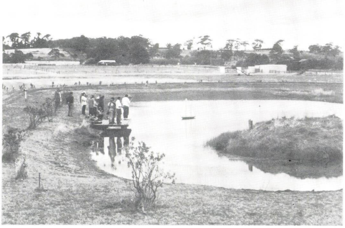
The station area with the lily pond in the foreground.

Where is Cobden?





Andrew Mierisch's VR X class loco visiting the Cobden track in February '96. The "living tunnel" in new condition in the background.



The lake with visiting members and their radio controlled boats.

Australian
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Under 25s Encouragement Award

1997 Entry Form

Name .... Age ....

Address ....

.... Phone ....

Club or Society (if applicable)...

Qualifications and/or occupation ....

....

Brief description of entry ....

....

....

Approx. dimensions & weight .... (Enclose photo if possible)

Equipment used in construction (e.g. lathe, drill press, hand tools etc.) ....

....

....

Other information relating to the entry (eg. outline of construction and assistance had, if any)

....

....

....

Australian Model Engineering undertakes that the privacy of entrants will be respected.

I hereby declare that:

1. I have personally constructed at least 75% of my entry.
2. I was under 25 years of age as at 31st December 1996.
3. I agree to the conditions of entry and that the judges decision will be final.
4. I agree to display the entry at the 1997 AALS convention site for the purposes of judging.

Signature .... Date ....

The AME Under 25s Encouragement Award

Conditions of Entry

Younger model engineers are making great contribution to the hobby, even though they are often hampered by having less access to tools and resources than older model engineers. AME instigated this award in 1993 to encourage under 25s to show their talents; to engender a spirit of encouragement in more experienced model engineers; and in a small way to foster the growth of participation by people in the younger age range.

We've been pleased to hear that a number of under-25s have been spurred on to complete their models by the thought of participating in the award.

If you fit the age criteria, photocopy the entry form on the next page, post or fax it to AME and start a-fittin' and a-turnin'!

Age criteria

If you turn 25 in the 1996 calendar year or later, you are eligible. If you turned 25 in the 1995 calendar year or earlier you are not eligible.

Entries

May be any model or experimental engineering item or model. For example it can be a steam, diesel or electric outline locomotive; steam, internal combustion, electric, hot air and Stirling cycle, stationary or mobile plant or road vehicles; boats or ships with any form of power drive; marine plant; workshop equipment, jigs, fixtures and aids to manufacture; clocks and other horological or astronomical items; electronic, programmable logic, digital and analogue controls and monitoring of any of the above models — or any other item(s) which the judges consider relevant to model engineering.

Judging

The following is taken into consideration:

- The age of the entrant and skills relevant to age.
- The ambitiousness of the project.
- The workmanship of the project.
- The access to workshop facilities.
- The location to resources and materials.
- The formal skills of the entrant.

The above is intended to even out the playing field so that the judges may look at each entry "all things considered." The idea is that the thirteen year old student (with no formal mechanical skills) from the Back'O'Bourke who works in a tin shed with pistol drill, hacksaw, file and hand scraper to build a model of a ferris wheel has as much chance as the 25-year-old qualified thou-splitting toolmaker with a CNC workshop and limitless resources who has turned out a VR H class 4-8-4 with working stoker engine!

Have a go!

The presentation will take place at the AALS convention at Cobden this coming Easter. Entries will be received up to day one of the convention. The perpetual trophy will be awarded at the AALS presentation night on Sunday evening. A prize (to keep) relevant to the winner's interest in the hobby will also be presented.

So come on all you younger model engineers, let's see the tables with plenty of entries on them in Cobden this Easter!

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AME Jan-Feb 1997

6 Boiler Tube "Bullets"

Shop Hints of Peter Dawes

When soldering tubes into the firebox and front tube plate, aligning 30 or more tubes into the corresponding holes in the tube plates can be a very frustrating job. Here is a way to make it easy, although you do have to make a "bullet" for each tube in advance. You will need 3 or 4ft of black steel of the diameter of the tubes, and a few hours of lathework.

For ½" tubes make the bullets out of ½" black iron and for 1" superheater tubes use 1" diameter. 12mm is just a shade too small for ½" tubes so if using metric steel it will have to be the next larger nominal size.

Cut off the required number of pieces, making each one about 1½" to 1¾" long (38-45mm) — not critical at all. It doesn't even matter if they are different lengths.

Turn the stem about ⅝" to ¾" (16-19mm) long for a free fit inside the tube.

The stem ends in a shoulder to stop it falling down the tube. That shoulder should be square-ended to prevent the sheet metal intermediate plate working its way into the gap and then spoiling the whole action of the bullet. The end of the stem should have a slight chamfer put on with a file while still in the lathe.

The body diameter is the only critical dimension and it should be about 10 thou less than the outside diameter of the tube. It is made about 3mm long or more, but again length isn't critical. It guides the tube right into the tubeplate hole. If too small the tube will still catch on the edge of the hole. If too big, it cannot pass through the hole in the tubeplate itself.

The tapered end is roughly about ¾" (19mm) long and tapered to an included angle of approximately 30-40 degrees. The end diameter is not important so anything from ⅛" to ¼" (3-6mm) is okay. Just round it off with the file while still in the lathe.

File the turned surfaces to remove burrs and ridges since black iron tends to finish more like a piece of sandpaper than nice smooth steel.

Machining order

Turn the stem part of all the pieces first, cleaning up the body to diameter at the same chucking. Then set the compound slide over to about 15-20 degrees (for about a 35 degree included angle). Hold the piece in the chuck via the stem and turn the taper.

Solder rings

Make up a set of ½" inside diameter silver solder rings from 245 grade 1/16" diameter solder wire. I find that the best size former for ½" rings is 7/16" rod. Cut the turns apart with end cutting nippers and then bend so the rings will lie flat. There should be a small gap between the ends when in place around a tube.

Soldering the tubes into the tubeplate

The tubes and firebox should have been pickled and be ready for soldering.

The tubes should have been cut to the same length to within 1/32" or 1mm and be lightly bevelled both inside and out. It's an advantage to dimple the ends of the annealed tubes about ¼" from the end. When they stand on the flat smooth steel base of the "retort stand" they will be automatically aligned at the top.

Make an intermediate support plate out of some scrap 16G sheet steel, to be supported about halfway up the stand via an angle bracket. Assuming that the tubes run parallel from front to back, it is drilled with the same hole pattern, otherwise it will have to be drilled with a pattern that is half way between the two. But they cannot be too different or the plate won't slide up the tubes. Drill the holes about 1/32" or 1mm larger (large enough to pass dimples), and chamfer the holes on the upper side.

This plate is needed to hold the tubes as you are putting them in place.

It stays there during the soldering. It can also remain on during later handling to protect the tubes from damage while ever the assembly is outside the boiler barrel.

Set up the whole assembly on a "retort stand" so that what will be the *front* ends of the tubes are located in the smokebox tubeplate temporarily placed at the *bottom*. The firebox will be upside down at the top to expose the inside face of the tubeplate.

The firebox tubeplate should be fluxed on both inside and outside surfaces.

Clean and flux the upper ends of the tubes. Insert them into the holes in the intermediate and bottom plates, one by one. When all are in place, drop a bullet into each tube and put the firebox over the assembly.

The tubes will jiggle in very easily. Tap the firebox lightly as needed to settle it down with the correct amount of tube projecting, or if you are using dimpled tubes, to settle it down on the dimples.

Check the alignment between the firebox and the column of tubes and then clamp the parts. Minor errors in alignment can be corrected later because the tubes will be very soft near the firebox and easy to bend. Tubes that are a loose fit should be expanded with a polished tapered steel rod so that there are no visible gaps. You can only do this at the time of final assembly.

When everything is in position to your satisfaction, lift the bullets out, drop a solder ring over the 1/16" of projecting tube, flux the inner tubeplate surface liberally with Comweld GP silver brazing flux, and then silver solder.

Use plenty of heat with *big* burners applied to the tubes underneath on opposite sides simultaneously, and some heat applied intermittently to the sides of firebox above. So ideally it is a two or three man job. Two men wield torches and the third is the welder's laborer, manipulating things, feeding solder rods and wielding the "scratch stick". Finish off with a smaller flame inside the firebox on the tops of the tubes, especially if the inner tubes are not getting quite hot enough.

With luck you should finish the complete set in one heat.

Silver soldering problems

The problems that might arise with the silver soldering are:

1. Solder rings dislodging and the metal running into a neighbouring tube.
2. Excessive clearance around a tube causing loss of solder. This can easily be prevented by swaging the tubes by expanding them with a tapered mandrel after they are aligned and before adding the rings, so that they are a tight fit in the plate. This mandrel has a taper of about four degrees included angle and should be polished smooth. It should be 10" long, or at least longer than the firebox.
3. Tubes not projecting sufficiently above the face of the tubeplate so that the solder runs down inside the tube or doesn't form a proper fillet. The boiler code specifies a minimum of 1/16" and up to ⅛" is okay.
4. Solder rings not fitting close to the tube, or touching neighbouring rings so that when the ring "runs" the solder ends up "next door". Also the ring must lie flat so that ends don't kick up in the air. When it melts, the airborne part can collapse to some other point and leave a gap in the join.

The bullets are used at least twice per boiler, first at the rear and then at the front. But very likely you will have to make one or more temporary assemblies with the front tubeplate in order to work on the parts before the actual soldering, so the bullets really do earn their keep.

At the end of soldering sessions they are washed in warm water to get rid of flux and given a spray with penetrating oil before storing. However always wash the oil off in water and detergent before each soldering job so it doesn't contaminate the soldering.

Repairs to Locomotive Boilers on the Victorian Railways

Water Treatment For Locomotive Boilers

by Doug Baxter

In the mid 1930s an experiment was carried out to prevent the action of electrolysis wasting away the diameter of crown stays and rivet heads in copper firebox boilers.

This was done by attaching slabs of zinc above the crown of the firebox, but it did not attain any great saving and was discontinued.

It was not until the late 1940s when the introduction of steel fireboxes was well under way that chemical treatment of feed water was introduced.

Purpose of water treatment

Water treatment as applied to Victorian Railways locomotives, is arranged by the addition of chemicals via the tender water tank to condition the water in the boiler by minimizing the deposition of scale and the incidence of corrosion in the boiler.

By keeping the build-up of scale on heat exchange surfaces to a minimum, a high boiler efficiency is maintained and by keeping corrosion to a minimum, the boiler life is increased and its maintenance decreased.

Method of application

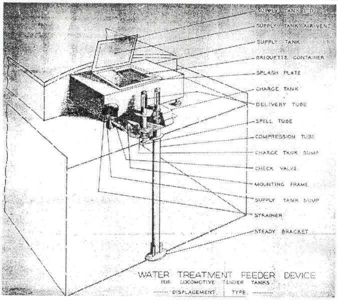
Practically all locomotives fitted with all-steel boilers had a displacement type water treatment feeder fitted on the tender. An illustration of the feeder, its description and operation are shown on the attached print. *(Unfortunately the poor photocopy of the 1950 print hasn't reproduced very well... ed)*

A certain amount of chemical is added directly to the tender tank, its purpose was to give the initial treatment to the raw water in the boiler by overcharging the water in the tender tank. The treatment actually takes place in the boiler, the chemicals being added via the tender only as a matter of convenience. The overcharged water in the tender tank is nearly all consumed by the boiler during the first trip — causing the amount of chemical in the boiler to reach the required concentration rapidly.

After an A-B, or a major mileage examination, the feeder is charged with chemicals (usually in briquette form) in quantities appropriate to the locomotive class and the district of operation and is completely filled to splashplate level with water. During this filling operation the cap should be left off the delivery tube and water added to the supply tank until it overflows the spill tube in the delivery tube.

The feeder operates automatically and is designed to feed sufficient chemical to treat the normal quantity of average quality water consumed by the locomotive during the 3000 miles to the next A-B mileage exam.

Where locomotives operated in bad water areas (such as on the Murtoa-Patchewollock line or the Maryborough-Mildura line) the chemical fed by the feeder was insufficient to treat the water consumed and at these locations supplementary additions of chemical were hand fed via the tender tank.



Preparation

The system is designed to provide sufficient chemical in liquid form for 3000 miles running. The briquette container is filled with a pre-determined number of briquettes at each A-B examination and the supply tank is filled with water. The chemical is automatically metered into the tender tank in proportion to the water taken.

Operation

a) **Charging**: *Water rising in the tender tank, traps and compresses air in the compression tube. The charge tank is then pressurized forcing the liquid to rise in the delivery tube as the check valve seats. Liquid is delivered into the tender tank via the spill tube while the water level rises in the water tank.*

b) **Re-charging**: *as the tender water level falls, the pressure in the charge tank is reduced. This allows the check valve to open and the liquid to flow though the connecting pipe. This re-fills the charge tank in readiness for the next water stop.*

Types of Treatment

There were two types of chemical briquettes used, the main one was Alfloc® "B" briquettes which is composed of approximately 65% soda ash (washing soda) and 35% Tannin. The other, used experimentally on certain locomotives at Ararat, Ballarat, Bendigo and North Melbourne and on all locomotives at Benalla was the Alfloc "No.58" briquette which was composed of 75% Tannin, 5% soda ash and 20% other chemicals.

Checking the operation of feeders

In order to ascertain if feeders were functioning correctly it was arranged to take, at approximately each 1000 miles, a dipstick reading and a sample of the boiler water for laboratory testing. It was the responsibility of the depot boilermaker to take these readings and water samples when the locomotive was at the depot during the shift.

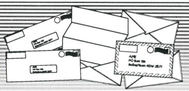
When the manufacture of locomotive boilers changed from copper fireboxes to steel fireboxes the internal steam pipes — namely injector delivery, blower, injector steam, etc., — remained copper. During the early fifties it was found, at the first internal examination of the boiler after four years, that these copper pipes had corroded mainly as grooves running lengthwise A program was commenced to replace them with steel pipes and future new boilers were fitted with steel, no further corrosion occurred.

In other words the feed water treatment protected ferrous metals but had detrimental effect on non-ferrous metal.

Finale

This article is the last of the series on repairs and maintenance to locomotive boilers and trust that they have been of assistance to those who maintain steam locomotives in service for historical purposes and those who are just plain interested.

Letter Box



Olympia remembered

Sir,

The article by Leigh Adams in A M E July '96 describing a visit to The Model Engineering Exhibition at Olympia, stirred some memories of that venue.

In the early 30s while living in Brentford, Middlesex, I served an apprenticeship with Ailsa Craig Ltd. of Strand-on-the-Green, located on the banks of the Thames at Chiswick.

In those days an exhibition was staged at Olympia called 'The Shipping and Engineering Exhibition'. We apprentices in our final year (in the Drawing Office) were delegated to assist in manning the firm's stand, I think it lasted two weeks.

We manufactured small marine engines 20 to 120 HP, both petrol and diesel, the latter fairly new to the small marine engine field. An arrangement with Bosch AG of Stuttgart, Germany, allowed the firm to use the Bosch patent combustion chamber.

In this system, the combustion chamber was located in the piston head resulting in a long and heavy piston, no doubt the reason it did not have a long future, however it did work.

The stand at Olympia had a selection of engines, petrol and diesel, the latter being a great source of interest. I was deputed to help on the stand, the first day was interesting, being all new, subsequent days became a bit of a bore as 90% of the questions was "where is the Magneto?" perhaps understandable, but I felt like putting up a sign "No Magnetos on Diesels".

Being impecunious, my wage was 15 shillings ($1.50) per week, (a fitters wage was about 4 pounds 10 shillings ($9.00) per week) I used to duck into Lyons Tea Shop, adjacent to the exibition hall, for a cup of tea and two chocolate eclairs, having found by experience that this satisified my hunger at least cost!

Them's were the days.

Dick Atkins
Wanganui, NZ

Injector testing

Sir,

Jim Price of the *Orange Society of Model Engineers,* who has an almost encyclopaedic knowledge of engineering and the model engineering literature has pointed out that there are some omissions in the article on the injector testing rig in July-August 1996 issue page 22. He doesn't want to write so I have taken it upon myself to do so.

Firstly, it is significant that an author somewhere has pointed out that the *thermal* efficiency of an injector that is not exhausting steam, is close to 100% because almost all of the heat in the steam is being transferred to the feedwater. The only inefficiency is the loss of heat away from the body of the injector and from the adjacent pipes. However this doesn't help us measure the injector's ability to fill a boiler.

I don't want to get into a technical bungfight over this issue but it seems to me that to measure the actual steam consumption the only way is to first measure the change in volume of the *feedwater*, and then the change in volume of the *output* from the simulator over the measured time of the test. The difference between these two has to be the volume of water due to condensed steam in the output, assuming of course that there is only water coming from the outlet and no steam.

The actual amount of steam could then be calculated from standard steam tables of pressure and temperature — if we wanted it.

As for measuring the volumes of water, there are two ways to do it. One is to use an accurate laboratory measuring cylinder. This will suffer from poor resolution because we have to be able to measure accurately down to a millilitre. It will suffice for just one or two rough measurements but not for many accurate sequential measurements, because the losses on transferring the water back and forth from containers to cylinder will eventually degrade the accuracy of the whole test to unacceptable levels.

Weighing the containers is easily the best way to do the measuring. One gram of water is one millilitre exactly (for the purposes of this exercise anyway, purists please note). The better way is to use a digital electronic weighing machine of the type commonly sold for use in the kitchen. These are quite cheap and have the advantage of having a digital resolution of one gram with a total capacity of about 2Kg. In fact, by using two — one continuously weighing the feedwater container and the other continuously weighing the output container — the testing procedure could be vastly speeded up. One problem is that they shouldn't be the type that automatically turn themselves off after a few seconds. Mine does, and that would be a nuisance.

The only caveat to using two machines instead of using the one machine for both measurements, is that they must be calibrated accurately against each other to at least a gram, Accuracy cannot be taken for granted since the specified accuracy of such machines is of the order of 2% or so. Two percent accuracy is quite okay to measure pumping rate but to measure steam consumption the way I have suggested, a small difference between two much larger volumes could easily end up with an error greater than 100%. You could plot a correction curve for one weighing machine against the other.

Secondly, Phillip Bellamy's article is a very similar design to an article published in the UK ME (W. Carter, UK *Model Engineer*, Issue 3519, 15 August 1975, page 818).

Thirdly, there is an omission from the diagram. It does not show that the disc on the left end of the "bobbin" in the device, or "spill valve" as Jim Price has aptly called it, must have passages for the water/steam to pass. This could be either by making it star-shaped or by drilling holes in it the same as the plug in the top of a safety valve is drilled to allow exhaust steam to escape. The function of the disc is simply to act as a guide to keep the "bobbin" aligned in the cylinder.

Anyone who thinks that there isn't much published on injectors will be interested to learn that a search I made of the UK *Model Engineer* using Henri Larose's computer index and using just the search-word "injector", turned up no less than eighty references between the dates 1950 and mid 1994. Of course this includes *all* references to "injector", including diesel injectors, letters in Postbag, injectors for specific projects, and even injector connections.

Other articles, including some significant ones by LBSC, were published before this date according to Jim, but Henry's computer index doesn't go back to before 1950. Does anyone have one that does?

Peter Dawes
NSW

Of blades and boilers

Sir,

Regarding the item on lower RH corner of p39 of AME issue 68.

Another handy use for old hacksaw blades is to grind the teeth off, and then grind them

Letterbox Contributions

Contributions of letters by mail to: PO Box 136, Robertson, NSW, 2577 or fax to: (02) 9646 1362 are very welcome.

As far as possible, AME is an open forum for all members of our hobby. Therefore, all expressions of fact or opinion — as long as they are not libellous — will be considered for publication.

Please **type or clearly print** your letters, as script is often difficult for the typist to interpret.

The Letterbox is a popular medium of expression, so space is limited. Therefore, letters of 400 words or less will have a better chance of being published.

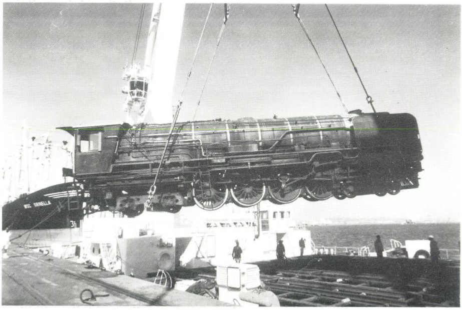
bmc

to use as depth gauges etc. I have found them very handy for this purpose when machining axles. Gauges for back to back dimension and for wheel and bearing seats are also useful. Depending on the job/chuck size, they can also be use as a hook gauge to measure the length to the rear of a job that goes deep behind the chuck.

In regard to the excellent serie of articles by Doug Baxter on VR locomotive boilers. As Locomotive Superintendent of Pichi Richi Railway I read this with considerable interest. Could Doug perhaps spend a little time explaining some of the boilermakers' trade terms for us? Examples are "pegging down" and "whipping in". It is possible to get a bit of an idea from the places they are used, but a bit more detailed explanation would be very useful.

Both my son Peter, and I are always looking forward to AME, it helps get the modelling juices moving!

Bryan Homann
SA



One of the two Republic of South African class 25NCs, purchased by Ian Welch, being loaded on to a heavy lift equipped ship at Durban. Next stop New Zealand.

Photo by courtesy of Natal Newspapers, Republic of South Africa

South African steam to NZ

Sir,

On page 41 of AME Issue 65 (March/April 1996) there was a short article about a New Zealand businessman and full-scale steam enthusiast, Ian Welch, who had purchased four ex-South African Railways steam locomotives to export to New Zealand.

A photograph was published in the *Cape Argus*, Friday 28 June 1996, showing one of the class 25NCs which Ian bought being loaded on to a ship in the Durban docks for transport to New Zealand. I traced the original photograph to Natal Newspapers, from whom I obtained a postcard-size copy. Perhaps it may be of interest to your readers. The loco number plates have been removed for safety, so its number is unknown from the photo.

Natal Newspapers hold the copyright to the photograph, but as you will see from the enclosed photocopy of their letter to me, in the circumstances of an Australian model engineering hobby magazine being involved, they very graciously waived their copyright fee.

Mike Thurgood
South Africa

A new reader's view

Sir,

As a new reader to AME — when I can find copies for sale on the news-stand or trade outlets — I am now convinced that I must subscribe or miss out on a good read.

As a novice, I was very impressed with the effort of the Hornsby club (NSW) on the open days last month at Galston *(refering to the HME Birthday weekend October 1996... ed)* and the range of stationary models on display — my favourite — I was hooked!

Last weekend (26, 27 October 1996) was worth the trip to Luddenham to the Model Park, even if the weather was damp. The small turnout must have been a little disappointing as, I was told by members that the September open day was also washed out. However, I enjoyed the scenic area, the variety of activities, and helpful advice on Steam, Boats, Cars and Aircraft.

I enjoy the spread and balance of your magazine — keep up the standard.

John West
NSW

In memorium

Sir,

It is with regret, the Bankstown Steam Locomotive Society wishes to inform all friends of the passing of Roy Alchin. He died on the weekend of the 14 December 1996 after an emergency operation. To all of his friends and acquaintances his presence at various exhibitions and Club meetings will be sorely missed.

Dick Young
Hon. Secretary BSLS

Painting Brass

by Ross Edmondson

Some time ago an old model engineering friend passed on to me a 'secret recipe' for painting brass. I have had startling results with its use where the paint has 'stuck' to the loco for over ten years, and I feel that it is now time to divulge this 'secret' to other model engineers.

Actually it's not much of a recipe, all you have to do is to dissolve as much 'napthalene flake' as possible in methylated spirit.

For openers 'napthalene flake' is the stuff your wife puts in the wardrobe to get rid of the silverfish and is a bit on the bugle. I used is an empty wine flagon (the hard part is to get it empty) into which I put about two cupfuls of napthalene flake and then filled it with the methylated spirit. In order to get the flake to dissolve properly, sit the brew on the end of the bench for a month and every time you go past it, give it a shake or two just to stir it up. A certain amount will dissolve into the metho and the rest will sit in the bottom of the flagon. After a period of time the flake will go hard but don't worry for what has dissolved will be okay. If you wish to get the hard bit out at a later stage it can be broken up with a screwdriver or other long instrument.

As most model engineers know, handling brass quickly tarnishes the lovely bright surface into something dull and lifeless. Whether it be tender sides, cab sides, or boiler lagging. Once you have finished the brass part it could be sand blasted with normal dry beach sand. Now don't despair, if you do the job properly you won't damage the finished project and not only does the sand blasting get rid of the 'crud' and anything else that it has picked up along the way during manufacture but it will actually improve the surface (similar to a very fine abrasive paper) which will give the paint something to hang on to! You will only require a small amount of the 'magic potion' for your job, pour sufficient into a clean fruit tin or jar. With the workpiece now sandblasted and ready to go please don't go and pick it up with your grubby hands — use a piece of clean soft cloth and, with a nice clean paintbrush, brush some of this 'soup' on to the job. The methylated spirit will very quickly dry on the job leaving behind a white flaky substance (napthalene flake). This is the 'key' to getting the paint to stick to the brass. Leave in the sun to dry out for a few minutes before applying the undercoat and finish coats, of course a quality paint is recommended and oh, yes, use a spray gun and not a brush! If you don't have the luxury of an air compressor or spray gun, someone in the club does...

News Desk

compiled by Brian Carter

Real late for some!

Our sincere apologies for the late arrival of the November-December magazine. In particular the NSW subscribers who didn't receive their copy until mid-December! A foul-up with our subscribers database sent 60 subscriber's details flying off into the ether! No, we won't blame the computer and we hope it won't happen again.

Our sincere apologies to our New Zealand readers who didn't get their magazine until well into December. It was nearly three weeks into November before the magazines left Australia. Unfortunately the delay was compounded with Australia Post's stretched resources due to Christmas mail.

This issue was late due to the previous issues being late. I will be on leave during January and will spend the time trying to bring the timetable back on track for the March-April issue.

Sorry readers, we'll try to do better in 1997.

New NZ rep

Please welcome Charlie Lear to the AME crew. Charlie is the president of the Hutt Valley Model Engineering Society (in the Wellington area). His phone number is 04 564 4049 (from Australia: 0011 64 4 564 4049) Fax: 04 564 2317. Email: clear@ibm.net

We hope that our New Zealand modellers take advantage of the personal assistance.

Excel scale calculator

I received an email from Jim Gray of Tasmania who was very happy with Tom Hulse's Excel® spreadsheet scale calculator that appeared in the September-October AME on page 40. Jim says: "Please convey to Tom Hulse my thanks for his brilliant Excel program for calculating scale dimensions. I had written a much simpler one using 7¼" for the model and 3'-6" for the prototype as this was my only area of interest at the time. Tom's program has now been entered and works perfectly (as you would expect). The only suggestion I would make is that the protection be turned on, leaving only the data entry cells unlocked.

A friend of mine who also runs the program is not computer literate, hence several times he tried to enter data in the wrong cells (accidentally) and overwrote the formulas. Locking the sheet solved the problem as he can now only enter data where it is supposed to go. Thank you for a superb magazine."

Information Super-railway

On the subject of email and electronic communication. Several model engineering clubs are now on the Internet. Many can be accessed directly from the Bendigo Society of Model Engineers home page:

http://www.hitech.net.au/jhovel/bsme/bsme.htm

Two recent additions to the listing are the Bankstown Steam Locomotive Society on:

http://www.accsoft.com.au/~nowcompu/trains.htm

and the Sydney Live Steam Locomotive Society at West Ryde on:

http://www.pnc.com.au/~wallison/index.html

You can also access AME directly on:

http://www.hitech.net.au/jhovel/bsme/ame.htm

The AME page has an image of the front cover plus a contents listing with a short description. You can see what's coming usually before it's printed! My thanks to Joe Hovel for maintaining this site.

Most web sites have links to other model engineering sites — you could end up all over the world chasing model engineering news!

Bob Sanderson

It is with sadness that I report on the death, on 23 August 1996, of Bob Sanderson after heart surgery.

Bob was the Technical Representative of the Australian Miniature Boiler Safety Committee for about five years and provided considerable input to the compilation of the boiler codes. He was widely known for his technical knowledge and experience. Bob was a recognized authority on fossil fuels.

Correction

On page 12 of AME issue 68 *The Building of Little Yarra* under the heading "The decision", second paragraph, should read 5" gauge at 1.875" per foot scale.

AME Address

Page 3 lists a different mailing address. It is one that has been used before. Either the Robertson or the Bundanoon address can be used — both post boxes will be kept open. However, it is our preference that the Bundanoon address is now used.

Help! Are we on the right track?

Our team of volunteers at AME works very hard to give you a magazine that you really enjoy and that keeps you in touch with people and techniques in our great hobby.

To produce the material that most of our readers want, we take notice of the letters, phone calls and personal comments we receive about AME. However, many of the "single-issue" opinions we listen to contradict each other. Now we want to tap into the opinions of a wider circle of our readers — including those who don't normally write to us. We need this information to set AME's course for the future.

You can help us by filling in the questionnaire in the middle of this issue and sending it to us — you won't need an envelope or postage stamp.

There are many helpful people who always respond to projects like this. Many others don't normally have the time or interest to respond — and yet we really need their opinions if we are to make the right decisions for the magazine's future. If you don't normally respond to questionnaires like ours, could you make this your one exception? You will only need about 15 minutes to give us your views.

We will *not* be asking you to put your name on the questionnaire unless you particularly want to — for example if you think we might want to contact you about an idea of yours that could need further discussion. If you *do* choose to give us your name and contact details, we will immediately separate your identifying details from the rest of the questionnaire. After six months we will safely dispose of all questionnaires. We promise we will *not* be passing any names, addresses or comments to anyone else.

Sometimes we have left the questions deliberately open so that your responses will reflect what you feel rather than what we have prompted. Where "tick boxes" appear, please tick in the box or boxes containing the closest answer. If you want to clarify or expand — even about something we haven't asked for — feel free to scribble in the margins or on an extra sheet. We'll read all your remarks and consider them carefully.

If there is any question you don't want to answer, that's fine — just answer what suits you.

If you want to have a say, now's the time to say it!

Classifieds

7¼" gauge "Black Five" for sale

- Steam Locomotive, professionally built by Bruce Teasedale and Ross Bishop-Weir. Loco has had maximum of 8 hours use from new. Copper boiler. Current boiler certificate must sell $22,500.00 ONO. Phone Greg Williams (07) 3278 7768

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- Narrow Gauge Locomotive. Forced Sale, Briggs Boiler only six months use. Loco was disassembled. New frame and Walschaerts motion built, except radius rod & return crank. Needs re-assembly $5,000. Ph Ray (07) 3202 3644

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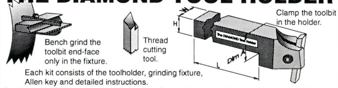
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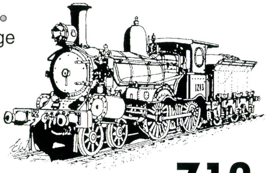

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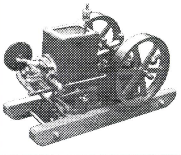

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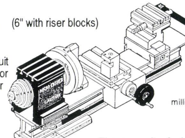

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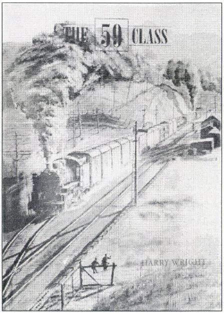
This book is written by Harry Wright (one of the authors of the popular 60 Class book). The text covers the background which led to the placing of the original order, USRA designs during WWII, loco shortages after WWII, prevailing loco designs, Lend Lease, and the Baldwin Locomotive Works, all of which played a part in the 59 class story. The author also relates his experience of working the 59 class along the NSW north coast line from Broadmeadow to South Brisbane in the days of steam.

The book follows the successful format used for the 60 class, with chapters on technical specifications, early test runs, subsequent modifications including conversion from oil to coal burning and problems the class encountered in their early days. The front cover features a specially commissioned painting from Robert Kingsford-Smith, a well known photographer and now artist. Inside are 66 full colour plates an 215 Black & White photos. There is also a fold out plan from Greg Edward's well known Data Sheets. Finally an appendix containing technical details and historical aspects of the class.



Following the progressive conversion of the 59s to coal fired, the class found a new niche working trains between Broadmeadow and Werris Creek and even beyond. The central obstacle on this route is the Liverpool Range which often necessitated bank-engines in both directions. The small station at Ardglen was near the summit and is the location depicted on the cover by Robert (Rags) Kingsford-Smith — a 59 working hard up the grade with the bank-engine pushing valiantly behind!

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